



L TPI SEARCH

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R2000 PROGRAM DESCRIPTION S17.1 AND S17.2

R2001 FUNCTIONAL DESCRIPTION

R2002 THE TPI SEARCH ROUTINE DETERMINES THE MINIMUM TOTAL VELOCITY TRANSFER TRAJECTORY FROM A GIVEN TPI
R2004 MANEUVER TIME WITHIN THE CONSTRAINT OF A SAFE PERICENTER. THIS VELOCITY IS THE SUM OF THE IMPULSIVE VELOCITIES
R2006 FOR THE TPI AND TPF MANEUVERS.
R2007 THE S17.1 ROUTINE EXTRAPOLATES THE STATE VECTORS OF BOTH VEHICLES TO THE TPI TIME AND COMPUTES THE
R2009 RELATIVE PHASE ANGLE BETWEEN THE VEHICLES, THE ALTITUDE DIFFERENCE (I.E. THE MAGNITUDE DIFFERENCE OF THE
R2011 POSITION VECTORS) AND SELECTS A SEARCH SECTOR BASED ON THE SIGN OF THE ALTITUDE DIFFERENCE.
R2013 THE S17.2 ROUTINE FURTHER DEFINES THE SEARCH SECTOR BY COMPUTING ANGULAR LIMITS AND USES THE TIME THETA
R2015 SUBROUTINE TO COMPUTE THE SEARCH START AND END TIMES. THE SEARCH IS THEN MADE IN AN ITERATIVE LOOP USING THE
R2017 LAMBERT SUBROUTINE TO COMPUTE THE VELOCITIES REQUIRED AT TPI TIME AND AT TPF TIME. EXIT FROM THE SEARCH LOOP
R2019 IS MADE WHEN SOLUTION CRITERIA ARE MET (NORMAL EXIT) OR AS SOON AS IT IS EVIDENT THAT NO SOLUTION EXISTS IN
R2021 THE SECTOR SEARCHED.

R2022 CALLING SEQUENCE

R2023 BOTH ROUTINES ARE CALLED IN INTERPRETIVE CODE AND RETURN VIA QPRET. S17.1 HAS ONLY A NORMAL EXIT.
R2025 S17.2 RETURNS VIA QPRET FOR NORMAL EXIT AND TO ALARMS FOR ERROR EXIT.
R2028 SUBROUTINES CALLED

R2029 CSMCONIC
R2030 LEMCONIC
R2031 TIMETHET
R2032 INITVEL

2033 36,2000
2034 REF 1 36,2000
2035 36,2000

BANK 36
SETLOC P17S
BANK

2036 REF 1

COUNT 36/TP1

2037 REF 17 LAST 520 E7,1537

EBANK= RACT3

R2038 **** TEMPORARY ****

2039	36,2000	00004 0	HPE	2DEC	157420.0 B-29	EARTH'S MIN. PERICENTER ALTITUDE 85 N.M.
2039	36,2001	31566 0				
2040	36,2002	00000 1	HPL	2DEC	10668.0213 B-29	MOON'S MIN. PERICENTER ALTITUDE 35000FT
2040	36,2003	12326 0				
2041	36,2004	00002 0	CDSEC	2DEC	40000	
2041	36,2005	16100 1				
2042	36,2006	00000 1	CLSEC	2DEC	15000	
2042	36,2007	35230 0				
2043	36,2010	12137 1	PIINVERS	2DEC	.3183098862	
2043	36,2011	06033 1				
2044	36,2012	06161 1	SEC1THET	2DEC	.1944444444	
2044	36,2013	30707 1				

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2045				36,2014	35252 1	SEC2THET 2DEC	.9166666667	
2045				36,2015	25253 1			
2046				36,2016	67777 1	MANYFEET 2DEC	-1.0 B-2	
2046				36,2017	77777 0			
2047				36,2020	00000 1	LIMVEL 2DEC	.6096 E-2 B-7	2FPS
2047				36,2021	30760 0			
2046				36,2022	00000 1	DPTMOON 2DEC	.1524 E3 B-29	500 FEET
2046				36,2023	00114 0			
2049				36,2024	00040 0	DP-.002 2DEC	0.002	
2049				36,2025	30447 0			
2050				36,2026	71220 1	S17.1 STO	DLOAD	
2051	REP	17	LAST	490	36,2027	01340 1	NORMEX	
2052	REP	10	LAST	484	36,2030	03663 1	TPI	
2053	REP	22	LAST	522	36,2031	34041 0	STCALL TDEC1	ADVANCE PASSIVE VEHICLE TO TPI
2054	REP	1			36,2032	27057 0	LEMCNIC	
2055					36,2033	77624 1	CALL	
2056	REP	2	LAST	490	36,2034	45372 0	LEMSTORE	
2057					36,2035	77745 1	DLOAD	
2056	REP	11	LAST	542	36,2036	03663 1	TPI	
2059	REP	23	LAST	542	36,2037	34041 0	STCALL TDEC1	ADVANCE ACTIVE VEHICLE TO TPI
2060	REP	1			36,2040	27045 0	CSMCNIC	
2061					36,2041	77624 1	CALL	
2062	REP	2	LAST	490	36,2042	45402 0	CSMSTORE	
2063					36,2043	77775 1	VLOAD	
2064	REP	18	LAST	541	36,2044	03540 0	RACT3	
2065					36,2045	63246 1	ABVAL PDVL	/RA/ 0D PL 2D
2066	REP	9	LAST	522	36,2046	03554 0	RPASS3	
2067					36,2047	65256 0	UNIT PDOL	UNIT RP 0D PL 6D
2068					36,2050	43021 0	EDSU SET	
2069					36,2051	00045 0	36D	/RP/ -/RA/
2070	REP	1			36,2052	00076 0	KFLAG	OFF = +
2071					36,2053	43040 1	R-N CLEAR	
2072					36,2054	74056 1	+2	
2073	REP	2	LAST	542	36,2055	00276 1	KFLAG	ON = -
2074	REP	2	LAST	276	36,2056	27754 1	STOVL DELHITE	
2075					36,2057	00001 0	0D	
2076					36,2060	53435 0	VXV UNIT	
2077	REP	9	LAST	522	36,2061	03562 0	VPASS3	
2076	REP	1			36,2062	27646 0	STOVL E2	ALMOST IT SAVE FOR 17.2
2079	REP	19	LAST	542	36,2063	03540 0	RACT3	
2080					36,2064	46206 1	PUSH VPROJ	
2081	REP	2	LAST	542	36,2065	03646 0	E2	
2082					36,2066	51352 1	VSL2 BVSU	RPA
2083					36,2067	50256 0	UNIT DOT	
2084					36,2070	00001 0	0D	
2085					36,2071	65552 0	SL1 ACOS	
2086					36,2072	77715 1	PDVL	
2087					36,2073	50235 0	VXV DOT	
2088	REP	20	LAST	542	36,2074	03540 0	RACT3	
2089	REP	3	LAST	542	36,2075	03646 0	E2	



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2090 36,2076 75325 1
2091 36,2077 77626 0
2092 REF 3 LAST 276 36,2100 61160 1
2093 REF 8 LAST 519 36,2101 00047 1
2094 REF 2 LAST 124 36,2102 37746 0
2095 REF 18 LAST 542 36,2103 01340 1
2096 36,2104 77220 1
2097 REF 2 LAST 121 36,2105 03657 0
2098 REF 21 LAST 542 36,2106 03540 0
2099 36,2107 50256 0
2100 REF 4 LAST 542 36,2110 03646 0
2101 36,2111 75446 0
2102 36,2112 43352 1
2103 REF 1 36,2113 34025 1
2104 36,2114 57414 1
2105 REF 3 LAST 542 36,2115 00316 0
2106 36,2116 74117 0
R2107 PHI(0)=180-(-(THETAZERO +K5IT)), PHI(1)=180-(-(THETAZERO+K2IT))
R2108 SIN(160-ALPHA)=SIN(ALPHA) ETC
2109 36,2117 40205 1
210905 REF 1 36,2120 34011 0
2110 36,2121 00001 0
2111 36,2122 45206 1
2112 REF 4 LAST 543 36,2123 02617 0
2113 REF 2 LAST 92 36,2124 02611 0
2114 36,2125 41525 0
2115 36,2126 43342 0
2116 36,2127 41415 1
2117 36,2130 43156 1
2118 REF 3 LAST 522 36,2131 03466 0
2119 REF 4 LAST 522 36,2132 16732 0
2120 36,2133 50146 1
212005 36,2134 74136 0
21201 36,2135 77676 0
2121 REF 4 LAST 522 36,2136 16734 0
212105 REF 3 LAST 543 36,2137 03746 1
21211 REF 9 LAST 543 36,2140 24047 1
2122 REF 10 LAST 542 36,2141 03554 0
2123 36,2142 77657 0
2124 36,2143 57176 0
2125 REF 4 LAST 522 36,2144 26657 1
2126 REF 10 LAST 542 36,2145 03562 0
2127 36,2146 77657 0
2128 36,2147 57176 0
2129 REF 6 LAST 522 36,2150 36746 1
2130 REF 3 LAST 522 36,2151 24737 1
2131 36,2152 77745 1
2132 REF 4 LAST 522 36,2153 00037 0
2133 REF 2 LAST 124 36,2154 03752 1
2134 REF 2 LAST 92 36,2155 16627 0

PDDL SIGN
STADR
STODL THETZERO
X1
STCALL XRS
NORMEX
STQ VLOAD
QTEMP
RACT3
UNIT DOT
E2
ABS SORT
SL1 DAD
DP-.002
BON DCOMP
KFLAG
+1
DMP SETPD
PIINVERS
OD
PUSH DSJ
THETZERO
STORE IT
PDDL PUSH
SR1 DAD
DAD PUSH
SIN SET
RVSW
STODL SYNH
COS RAN
+2
DCOMP
STODL CSIH
XRS
STOVL X1
RPASS3
VSR*
0,2
STOVL RVEC
VPASS3
VSR*
0,2
STCALL VVEC
TIMETHET
DLOAD
T
STORE TP
STODL TPO

CENTRAL ANGLE

SAVE INDICES FOR FURTHER USE
+= ACTIVE AHEAD -= ACTIVE BEHIND
COMPUTE SEARCH SECTOR LIMITS

ADD .002 RADIANS TO IT
GIVES CORRECT SINE, COSINE MUST BE
COMP. ADD .5 FOR ANGLE

REVOLUTIONARY HERES TWO IT

PHI(1) , -(THETZERO + K2IT)

PHI(0) , -(THETZERO + K5IT)

SAVE START TIME AND GET END TIME



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2135	REP	3	LAST	543	36,2156	02811 0		IT	
2136					36,2157	73406 1		PUSH	SIN
2137	REP	5	LAST	543	36,2160	16732 0		STODL	SNTH
2138					36,2161	50146 1		COS	RNN
213805					36,2162	74184 1			+2
21381					36,2163	77676 0		DCOMP	
2139	REP	5	LAST	543	36,2164	02734 0		STORE	CSTH
2140					36,2165	45150 1		LXA,1	CALL
2141	REP	4	LAST	543	36,2166	03745 1			XRS
2142	REP	4	LAST	543	36,2167	24737 1			TIMETHET
R2143	INITIALIZE LOOP								
2144					36,2170	43145 0		DLOAD	CLEAR
2145	REP	5	LAST	543	36,2171	00037 0			T
2146	REP	5	LAST	481	36,2172	03661 0			ITSWICH
2147	REP	2	LAST	92	36,2173	16621 0		STODL	TPI
2148	REP	6	LAST	497	36,2174	15340 1			DPPOS MAX
2149	REP	2	LAST	92	36,2175	16623 1		STODL	DELVEE
2150	REP	1			36,2176	34017 0			MANYFEET
2151	REP	2	LAST	92	36,2177	16625 1		STODL	HP
2152	REP	1			36,2200	34013 1			SEC1THET
2153					36,2201	71214 0		BON	DLOAD
2154	REP	4	LAST	543	36,2202	00316 0			KFLAG
2155					36,2203	74205 0			+2
2156	REP	1			36,2204	34015 1			SEC2THET
2157	REP	2	LAST	124	36,2205	37750 1		STCALL	THETL
2158	REP	1			36,2206	74230 0			CONCAUL
2159					36,2207	70545 1	BIS	DLOAD	SR1
2160	REP	6	LAST	544	36,2210	02734 0			CSTH
2161	REP	2	LAST	262	36,2211	14021 1		STODL	COSTH
2162	REP	6	LAST	544	36,2212	02732 0			SNTH
2163					36,2213	77742 0		SR1	
2164	REP	2	LAST	262	36,2214	34023 1		STCALL	SINTH
2165	REP	2	LAST	262	36,2215	47211 0			ARCTRIG
2166					36,2216	43244 1		BPL	DAD
2167					36,2217	74221 0			+2
2168	REP	7	LAST	544	36,2220	15340 1			DPPOS MAX
2169					36,2221	65221 0		BDSU	POOL
2170	REP	3	LAST	544	36,2222	03750 0			THETL
2171	REP	3	LAST	543	36,2223	03752 1			TF
2172					36,2224	75225 0		DSU	SIGN
2173	REP	3	LAST	544	36,2225	02621 0			TPI
2174					36,2226	77640 0		RNN	
2175	REP	1			36,2227	74432 1			RNGETEST
R2176	ADVANCE PASSIVE FOR TARGET VECTOR								
2177					36,2230	77745 1	CONCAUL	DLOAD	
2178	REP	12	LAST	542	36,2231	03663 1			TTPI
2179					36,2232	43015 1		DAD	BON
2180	REP	4	LAST	544	36,2233	03752 1			TF
2181	REP	5	LAST	523	36,2234	01312 0			AVFLAG
2182	REP	1			36,2235	74242 0			ADVCS4



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2183	REP	24	LAST	542	36,2238	34041 0	STCALL	TDEC1
2184	REP	2	LAST	542	36,2237	27057 0		LEMCONIC
2185					36,2240	77650 1	GOTO	
2186	REP	1			36,2241	74244 0		JUNCT3
2187	REP	25	LAST	545	36,2242	34041 0	ADVCSM	STCALL
2188	REP	2	LAST	542	36,2243	27045 0		TDEC1
R2189								CSMCONIC
								SAVE BACK VALUES OF HP AND DELVEE
2190					36,2244	77775 1	JUNCT3	VLOAD
2191	REP	12	LAST	519	36,2245	00007 0		VATT
2192	REP	5	LAST	520	36,2248	27840 0	STOVL	VPASS4
2193	REP	18	LAST	519	36,2247	00001 0		RATT
2194	REP	2	LAST	121	36,2250	03632 0	STORE	RPASS4
219405	REP	9	LAST	483	36,2251	17415 1	STOVL	RTARG
2195	REP	5	LAST	544	36,2252	03752 1		TP
2196	REP	7	LAST	482	36,2253	17423 1	STOVL	DELLT4
2197	REP	3	LAST	544	36,2254	02825 1		HP
2198	REP	2	LAST	92	36,2255	16631 1	STOVL	HPO
2199	REP	3	LAST	544	36,2256	02823 1		DELVEE
2200	REP	2	LAST	92	36,2257	16633 0	STOVL	DELVEO
R2201								PREPARE FOR LAMBERT
2202	REP	13	LAST	544	36,2260	03663 1		TPI
2203	REP	8	LAST	519	36,2261	17503 1	STOVL	INTIME
220305	REP	5	LAST	544	36,2262	03748 1		XRS
22031	REP	8	LAST	491	36,2263	17748 1	STOVL	RTX1
220313	REP	3	LAST	528	36,2264	15332 1		HI8ZEROS
220315					36,2265	65201 1	SETD	PDDL
22032					36,2266	00001 0		OD
220325	REP	2	LAST	467	36,2267	33147 0		EPSPOUR
22033					36,2270	77715 1	PDVL	
220335	REP	22	LAST	543	36,2271	03540 0		RACT3
22034	REP	10	LAST	485	36,2272	27570 0	STOVL	RINIT
220345	REP	8	LAST	490	36,2273	03546 0		VACT3
22035	REP	9	LAST	485	36,2274	37578 1	STCALL	VINIT
2207	REP	2	LAST	467	36,2275	22000 1		INITVEL
R2208								COMPUTE H ET CETERA
2209					36,2278	52375 1	VLOAD	VSU
2210	REP	8	LAST	520	36,2277	03620 0		VTPRIME
2211	REP	8	LAST	545	36,2300	03840 0		VPASS4
2212					36,2301	41448 1	ABVAL	PUSH
2213	REP	2	LAST	92	36,2302	26637 1	STOVL	RELDLV
2214	REP	14	LAST	520	36,2303	03648 0		DELVEET3
2215					36,2304	77848 0	ABVAL	
2216	REP	2	LAST	92	36,2305	02635 0	STORE	MAGVTPI
2217					36,2308	45415 0	DAD	SDADR
2218	REP	4	LAST	545	36,2307	61154 0	STOVL	DELVEE
2219	REP	6	LAST	545	36,2310	03746 1		XRS
2220	REP	10	LAST	543	36,2311	24047 1	STOVL	X1
2221	REP	10	LAST	520	36,2312	03612 1		VIPRIME
2222					36,2313	77657 0	VSR*	
2223					36,2314	57176 0		0,2

/V2-VP(TPI+TP)/
V1-VA
/V1-VA/



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2224	REP	7	LAST	543	36,2315	26746 0	STOVL	VVEC	
2225	REP	23	LAST	545	36,2316	03540 0		RACT3	
2226					36,2317	77657 0	VSR*		
2227					36,2320	57176 0		0,2	
2228	REP	5	LAST	543	36,2321	36657 0	STCALL	RVEC	
2229	REP	1			36,2322	45322 0		PERIAPO	
2230					36,2323	71354 0	LXA,2	DLOAD	
2231	REP	7	LAST	545	36,2324	03746 1		XRS +1	
2232					36,2325	77657 0	SL*		
2233					36,2326	57576 1		0,2	
2234	REP	4	LAST	545	36,2327	02625 1	STORE	HP	
2235	ITSWICH DENOTES INTERPOLATION--SOLUTION ACCEPTANCE IS FORCED						BOCN	DLOAD	
2236					36,2330	71214 0		ITSWICH	
2237	REP	6	LAST	544	36,2331	03701 1		ENDEN	
2238	REP	1			36,2332	74443 1		HPERMIN	
2239	REP	7	LAST	514	36,2333	02321 0	DSU	BN	
2240					36,2334	50025 0		HP	
2241	REP	5	LAST	546	36,2335	02625 1		HALFSAFE	
2242	REP	1			36,2336	74401 1	POOL	DSU	WAS PERICENTER ALT SAFE
2243					36,2337	45325 1		HPERMIN	
2244	REP	8	LAST	546	36,2340	02321 0		HPO	
2245	REP	3	LAST	545	36,2341	02631 1	BN	DSU	(HPLIM-HPO)-(HPLIM-HP)=HP-HPO
2246					36,2342	45240 0		INTERP	SOLUTION AT HAND
2247	REP	1			36,2343	74360 1	BN	DLOAD	
2248					36,2344	71240 1		ALARMS	ITS GETTING WORSE - SOUND THE ALARM
2249	REP	1			36,2345	73534 1		CDEEC	
2250	REP	1			36,2346	34005 0	JUNCT1	BOFF	OFF IS PLUS ON IS MINUS
2251					36,2347	57414 1		DCOMP	
2252	REP	5	LAST	544	36,2350	00356 1		KFLAG	
2253					36,2351	74352 0		+1	
2254	REP	2	LAST	124	36,2352	03744 0	STORE	DELTEE	
2255					36,2353	43345 1	JUNCT2	DLOAD	
2256	REP	3	LAST	546	36,2354	03744 0		DELTEE	
2257	REP	6	LAST	545	36,2355	03752 1		TF	
2258	REP	7	LAST	546	36,2356	37752 0	STCALL	TF	
2259	REP	1			36,2357	74207 1		BIS	RECYCLE
2260					36,2360	45214 1	INTERP	DSU	HP-HPO
2261	REP	7	LAST	546	36,2361	03461 1		ITSWICH	
2262					36,2362	65301 0	NORM	POOL	
2263	REP	11	LAST	545	36,2363	00047 1		X1	
2264	REP	1			36,2364	34023 1		DFTMOON	
2265					36,2365	45215 0	DAD	DSU	
2266	REP	9	LAST	546	36,2366	02321 0		HPERMIN	
2267	REP	6	LAST	546	36,2367	02625 1		HP	
2268					36,2370	70501 1	NORM	SR1	
2269	REP	6	LAST	506	36,2371	00050 1		X2	
2270					36,2372	56264 1	XSU,2	DDV	
2271	REP	12	LAST	546	36,2373	00046 0		X1	
2272					36,2374	53605 1	DMP	SR*	
2273	REP	4	LAST	546	36,2375	03744 0		DELTEE	



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2274				36,2378	57177 1		0 -1,2	
2275	REF	5	LAST	546	36,2377	37744 1	STCALL	DELTEE
2276	REF	1			36,2400	74353 1		JUNCT2
2277					36,2401	45325 1	HALPSAFE	PDDL
2278	REF	5	LAST	545	36,2402	02623 1		DSU
2279	REF	3	LAST	545	36,2403	02633 0		DELVEE
2280					36,2404	51408 1		DELVEO
2281					36,2405	50025 0	PUSH	ABS
2282	REF	1			36,2408	34021 0	DSU	R-N
2283	REF	2	LAST	546	36,2407	74443 1		LIMVEL
2284					36,2410	45345 1		ENDEN
2285	REF	10	LAST	546	36,2411	02321 0	DLOAD	DSU
2286	REF	4	LAST	546	36,2412	02631 1		HPERMIN
2287					36,2413	77725 1		HPO
2288					36,2414	71240 1	PDDL	
2289	REF	1			36,2415	74424 0	R-N	DLOAD
2290					36,2416	71244 0		LRGRDVO
2291	REF	2	LAST	546	36,2417	74360 1	BPL	DLOAD
2292	REF	6	LAST	547	36,2420	03744 0		INTERP
2293					36,2421	57542 0		DELTEE
2294	REF	7	LAST	547	36,2422	37744 1	SR1	DCOMP
2295	REF	2	LAST	547	36,2423	74353 1	STCALL	DELTEE
2296					36,2424	77745 1		JUNCT2
2297					36,2425	71240 1	LRGRDVO	DLOAD
2298	REF	3	LAST	547	36,2426	74353 1	R-N	DLOAD
2299	REF	1			36,2427	34007 1		JUNCT2
2300					36,2430	77650 1		CLSEC
2301	REF	1			36,2431	74347 1	GOTO	
R2302	TIME	RAN	OUT	ASSUME	SOLUTION	IP SAFE	PERICENTER	JUNCT1
2303					36,2432	45345 1	RNGETEST	DLOAD
2304	REF	7	LAST	546	36,2433	02625 1		DSU
2305	REF	11	LAST	547	36,2434	02321 0		HP
2306					36,2435	71240 1		HPERMIN
2307	REF	2	LAST	546	36,2436	73534 1	R-N	DLOAD
2308	REF	8	LAST	546	36,2437	03752 1		ALARMS
2309					36,2440	77625 0		TP
2310	REF	8	LAST	547	36,2441	03744 0	DSU	
2311	REF	9	LAST	547	36,2442	03752 1		DELTEE
2312					36,2443	77775 1	STORE	TP
2313	REF	9	LAST	545	36,2444	03620 0	ENDEN	VLOAD
2314					36,2445	65241 0		VTPRIME
2315	REF	3	LAST	545	36,2446	03632 0	DOT	PDDL
2316	REF	3	LAST	545	36,2447	02637 1		RPASS4
2317					36,2450	45565 0		RELDELV
2318	REF	4	LAST	547	36,2451	41140 1	SIGN	STADR
231805	REF	1			36,2452	18440 0	STCALL	RELDELV
23181					36,2453	50375 0		TRANSANG
2319	REF	24	LAST	546	36,2454	03540 0	VLOAD	DOT
2320	REF	11	LAST	545	36,2455	03612 1		RACT3
2321					36,2456	51165 1	VIPTIME	
							SIGN	BPL

SAVE HP-HPLIM FOR POSSIBLE

SAVE THIS TOO

2 FT PS

TIME OF SOLUTION

SG2 WITH MAGNITUDE

NOW SIGN(RELDELV)=SIGN(SG2)

COMPUTE OMEGA T , CENTRAL ANGLE

SG1

IF POSITIVE THEN SG1 = SG2 OTHERWISE



L TPI SEARCH

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2322	REP	5	LAST	547	36,2457	02637 1		RELDLV	
2323	REP	1			38,2460	74470 1		USEKAY	SIGN(SG2-SG1)=SIGN(SG2)=SIGN(RELDLV)
2324					38,2461	57535 0	SLOAD	DCOMP	
2325	REP	2	LAST	467	38,2462	33144 0		DECTWO	
2326					38,2463	51165 1	SIGN	BPL	
2327	REP	6	LAST	546	38,2464	02637 1		RELDLV	
2328	REP	1			38,2465	74476 1		NEXUS	
232805					38,2466	52076 1	DCOMP	GOTO	
23281	REP	2	LAST	546	38,2467	74474 0		USEKAY +4	
2329					38,2470	43135 1	USEKAY	SLOAD	BCN
2330	REP	3	LAST	546	38,2471	33144 0		DECTWO	
2331	REP	6	LAST	546	38,2472	00316 0		KFLAG	
2332	REP	2	LAST	546	38,2473	74476 1		NEXUS	
2333					38,2474	77625 0	DSU		
2334	REP	2	LAST	450	36,2475	38100 0		P21QENN	
2335	REP	2	LAST	275	36,2476	17646 0	NEXUS	STODL	NN1
233505	REP	8	LAST	547	36,2477	02625 1		HP	
2336	REP	4	LAST	520	36,2500	36641 1	STCALL	POSTTPI	
2337	REP	3	LAST	543	36,2501	03657 0		QTEMP	
23371					07,2440		RANK	07	
23372	REP	1			07,2000		SETLOC	XANG	
23373					07,2440		RANK		
23374	REP	1					COUNT	07/XANG	

R2336 CENTRAL ANGLE SUBROUTINE
R2339 THIS SUBROUTINE COMPUTES THE CENTRAL ANGLE OF TRAVEL OF THE
R2340 PASSIVE VEHICLE DURING THE TRANSFER.

2341					07,2440	40220 0	TRANSANG STO	SETPD	
2342	REP	15	LAST	519	07,2441	02370 1		SUREXIT	
2343					07,2442	00001 0		0	
2344					07,2443	73150 1	LXA,1	LXA,2	
2345	REP	6	LAST	546	07,2444	03745 1		XRS	
2346	REP	9	LAST	546	07,2445	03746 1		XRS +1	
2347					07,2446	53775 1	VLOAD	VSR*	
2348	REP	7	LAST	545	07,2447	03640 0		VPASS4	
2349					07,2450	57176 0		0,2	
2350	REP	6	LAST	546	07,2451	22746 1	STODL*	VVEC	
2351	REP	3	LAST	466	07,2452	11633 1		MUTABLE +2,1	
2352					07,2453	53715 1	PDVL	VSR*	00D
2353	REP	4	LAST	547	07,2454	03632 0		RPASS4	
2354					07,2455	57176 0		0,2	
2355					07,2456	64646 1	ABVAL	PDOL*	MAGNITUDE OF R (+29 OR +27) 02D
2356	REP	4	LAST	546	07,2457	11631 0		MUTABLE,1	
2357					07,2460	47515 0	PDVL	VSO	1/MU (+34 OR +26) 04D
2358	REP	9	LAST	546	07,2461	02746 0		VVEC	
2359					07,2462	57301 1	NORM	DMPR	PUSH LIST AT 02D
2360	REP	13	LAST	546	07,2463	00047 1		X1	
2361					07,2464	53605 1	DMP	SRR*	
2362					07,2465	00003 1		02D	



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2383				07,2468	21578 0			0 -3,1	
2384				07,2467	77821 1	BDSU			R V**/MU (+8)
2385	REF	1		07,2470	11508 1			D1/32	
2388				07,2471	85301 0	NORM		PDDL	
2387	REF	14	LAST	548	07,2472	00047 1		X1	(2 - R V**/MU) (+8-N)
2388					07,2473	58382 0	SR1R	DDV	MAGNITUDE OF R (+30 OR +28)
2389					07,2474	41457 1	SL*	PUSH	R/(2 - R V**/MU) (+29 OR +27)02D
2370					07,2475	20174 1		0 -5,1	
2371					07,2478	75542 0	SR1	SRGT	
2372					07,2477	77805 1	DMP		
2373					07,2500	85301 0	NORM	PDDL	ASUBP***
2374	REF	15	LAST	549	07,2501	00047 1		X1	00D
2375					07,2502	58342 1	SR1	DDV	
2378					07,2503	53605 1	DMP	SL*	
2377	REF	10	LAST	547	07,2504	03752 1		TP	
2378					07,2505	20201 0		0,1	
237805					07,2508	60325 0	PDDL	NORM	
23781	REF	1			07,2507	11520 0		2PISC	
237815	REF	18	LAST	549	07,2510	00047 1		X1	
23782					07,2511	58325 0	PDDL	DDV	
237825					07,2512	77657 0	SL*		
23783					07,2513	20178 0		0 -3,1	CENTANG = (SORT(MU/ASUP***)TF)
2379	REF	8	LAST	522	07,2514	37754 0	STCALL	CENTANG	IN REVOLUTIONS B-0
2380	REF	18	LAST	548	07,2515	02370 1		SUBEXIT	
2381					35,3431		BANK	35	
2382	REF	1			35,2000		SETLOC	P17S1	
2383					35,3431		BANK		
23835	REF	1					COUNT	35/P17	

R2384 TPI SEARCH DISPLAY ROUTINE

2385	REF	5	LAST	521	35,3431	0 3728 1	P17	TC	AVFLAG	AVFLAG = CSW , SET TRACK + UPDATE FLAGS
2388	REF	1			35,3432	0 3434 1		TC	P17.1	
2387	REF	5	LAST	521	35,3433	0 3741 0	P77	TC	AVFLAG	AVFLAG = LEM , SET TRACK + UPDATE FLAGS
2388	REF	5	LAST	521	35,3434	0 3746 1	P17.1	TC	P20FLAG	SET UPDATE FLAG
238805	REF	3	LAST	458	35,3435	3 3125 1		CAP	V08N37	DISPLAY TPI TIME
2389	REF	5	LAST	472	35,3436	0 3114 0		TC	VNPOOH	
2390	REF	72	LAST	537	35,3437	0 8008 1		TC	INTPRET	
2391					35,3440	45014 0		CLEAR	CALL	
2392	REF	8	LAST	520	35,3441	00670 0			UPDATAFLG	
2393	REF	1			35,3442	74028 0			S17.1	UPDATE STATE VECTORS TO TPI
2394					35,3443	78014 0		SET	AXT,1	
2395	REF	9	LAST	549	35,3444	00470 1			UPDATAFLG	
2398					35,3445	00002 0		DEC	2	DELTA H = 2 K POSITIVE , KFLAG OFF
2397					35,3448	78014 0		BOFF	AXT,1	
2398	REF	7	LAST	548	35,3447	00358 1			KFLAG	
2399					35,3450	73452 0			+2	
2400					35,3451	00001 0		DEC	1	DELTA H = 1 K NEGATIVE , KFLAG ON
2401					35,3452	77530 1		SXA,1	EXIT	
2402	REF	8	LAST	518	35,3453	01132 0			OPTION2	

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2403 REP 1 35,3454 3 3543 0
 2404 REP 1 35,3455 0 3517 1
 2405 REP 73 LAST 549 35,3456 0 6006 1
 2406 35,3457 43014 0
 2407 REP 10 LAST 549 35,3460 00670 0
 2408 REP 6 LAST 549 35,3461 00076 0
 2409 35,3462 45335 0
 2410 REP 7 LAST 549 35,3463 01133 1
 2411 REP 3 LAST 546 35,3464 36100 0
 2412 35,3465 43030 0
 2413 35,3466 73470 0
 2414 REP 9 LAST 550 35,3467 00276 1
 2415 35,3470 46135 1
 2416 REP 10 LAST 546 35,3471 03747 0
 2417 35,3472 73476 0
 2418 35,3473 52145 0
 2419 REP 1 35,3474 34003 0
 2420 REP 1 35,3475 73500 0
 2421 35,3476 77745 1
 2422 REP 1 35,3477 34001 1
 2423 REP 12 LAST 547 35,3500 36321 1
 2424 REP 1 35,3501 74104 1
 2425 35,3502 77414 0
 2426 REP 11 LAST 550 35,3503 00470 1
 2427 REP 2 LAST 457 35,3504 3 3127 0
 2428 REP 2 LAST 550 35,3505 0 3517 1
 2429 REP 2 LAST 475 35,3506 3 3126 1
 2430 REP 120 LAST 536 35,3507 0 4555 0
 2431 REP 5 LAST 516 35,3510 20763 1
 2432 REP 17 LAST 523 35,3511 0 4106 1
 2433 REP 16 LAST 550 35,3512 0 4106 1
 2434 REP 2 LAST 549 35,3513 0 3434 1
 2435 REP 29 LAST 506 35,3514 3 4711 1
 2436 REP 5 LAST 518 35,3515 0 5415 1
 2437 REP 66 LAST 536 35,3516 1 5112 1
 24375 REP 13 LAST 523 35,3517 0 0006 1

CAP V06N72
 TC VNCOMP17
 TC INTPRET
 CLEAR SET
 UPDATFLG
 KFLAG
 SLOAD DSU
 OPTION2
 P21ONENN
 CLEAR
 +2
 KFLAG
 SLOAD BHIZ
 XRS +1
 +4
 DLOAD GOTO
 HPL
 P17.2
 DLOAD
 HPE
 STCALL HPERMIN
 S17.2
 SET EXIT
 UPDATFLG
 CAP V06N56
 TC VNCOMP17
 CAP V06N55
 TC HANKCALL
 CADR GOFLASH
 TC GOTOPOOH
 TC GOTOPOOH
 TC P17.1
 CAP TWO
 TC BLANKET
 TCP ENDOPJOB
 BHANK= RTRN

DISPLAY PHI , DELTA H , SEARCH OPTION K

RESET KFLAG ON FOR OPTION =1
 OFF FOR OPTION =2

P17.2

P17.3

DISPLAY DELTA VTPI , DELTA VTFF , AND H

DISPLAY PERICENTER CODE AND CENTRAL ANG,

TERMINATE PROGRAM
 END PROGRAM
 RECYCLE WITH NEW TPI OR SEARCH OPTION
 BLANK R2

2438 35,3517 0 0006 1
 2439 REP 4 LAST 474 35,3520 23*766 1
 2440 REP 6 LAST 523 35,3521 55*765 0
 2441 REP 7 LAST 550 35,3522 3 1765 1
 2442 REP 121 LAST 550 35,3523 0 4555 0
 2443 REP 17 LAST 523 35,3524 20624 0
 2444 35,3525 0 3522 1
 2445 REP 5 LAST 550 35,3526 0 1766 1
 2446 REP 246 LAST 537 35,3527 4 0154 0
 244605 REP 32 LAST 536 35,3530 6 4705 1
 24461 35,3531 0 0006 1
 244615 REP 3 LAST 550 35,3532 1 3434 0
 24462 REP 3 LAST 550 35,3533 0 3522 1

VNCOMP17 EXTEND
 QXCH OSAVED
 TS VERBNOUN
 CA VERBNOUN
 TCR HANKCALL
 CADR GOFLASH
 TC -3
 TC OSAVED
 CS MPAC
 AD BITS
 EXTEND
 BZF P17.1
 TC VNCOMP17 +3

TERMINATE ILLEGAL REDISPLAY
 PROCEED
 RECYCLE WITH NEW TPI TIME
 OR PROCEED WITH NEW SEARCH OPTION



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2447				35,3534	77414 0	ALARMS	SET	EXIT
2448	REF	12	LAST	550	35,3535	00470 1		UPDATPLG
2449	REF	25	LAST	458	35,3538	0 5537 0	TC	ALARM
2450					35,3537	00124 0	OCT	00124
2451	REF	2	LAST	458	35,3540	3 4743 0	CAP	V05N09
2452	REF	4	LAST	550	35,3541	0 3517 1	TC	VNCMP17
2453	REF	19	LAST	550	35,3542	0 4108 1	TC	GOTOPOOH
2454					35,3543	01510 1	V08N72	VN 0872

NO SAFE PERCENTER IN THIS SECTOR

PROCEED ILLEGAL TERMINATE PROGRAM



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R0001 RENDEZVOUS NAVIGATION PROGRAM 20
R0002 PROGRAM DESCRIPTION
R0003 MOD NO -1
R0004 MOD BY - N.BRODEUR
R0005 FUNCTIONAL DESCRIPTION
R0008
R0007 TO CONTROL THE CSM ATTITUDE AND OPTICS TO ACQUIRE THE LEM IN THE S+T
R0008 FIELD AND TO POINT THE CSM TRANSPONDER AT THE LEM. TO UPDATE EITHER THE
R0009 LEM OR CSM STATE VECTOR (AS SPECIFIED BY THE ASTRONAUT BY THE DSKY
R0010 ENTRY) ON THE BASIS OF OPTICAL TRACKING DATA (REQUESTED BY DSKY)
R0011 CALLING SEQUENCE -
R0012
R0013 ASTRONAUT REQUEST THROUGH DSKY V37E20E
R0014 SUBROUTINES CALLED-
R0015 R02BOTH (IMU STATUS CHECK) BANKCALL
R0018 FLAGUP 2PHSCHNG LOADTIME
R0017 R01CSM (PREFERRED TRACKING ATTITUDE) FLAGDOWN
R0018 R52 (AUTO OPTICS POSITIONING ROUT) SETINTG
R00181 R22 (REND TRACK DATA PROC ROUT) PRIORCHNG
R0019 ENDOPJOB INTEGRV GRP2PC
R0020 INTPRET MKRLEES FINDVAC
R0021 NORMAL EXIT MODES-
R0022 P20 MAY BE TERMINATED IN TWO WAYS-ASTRONAUT SELECTION OF IDLING
R0023 PROGRAM (P00) BY KEYING V37E00E OR BY KEYING IN V56E
R0024 ALARM OR ABORT EXIT MODES-
R0025 NONE DIRECTLY FROM P20.
R0028 OUTPUT
R0027 TRCKCNT = NO OF RENDEZVOUS TRACKING MARKS TAKEN (COUNTER)
R0028 VHF CNT = NO OF VHF RANGING MARKS INCORPORATED (COUNTER)
R0029 FLAGS SET + RESET
R0030 RNDVZFLG, VEHUPFLG, UPDATFLG, TRACKFLG, TARG1FLG
R0031 HOLDFLAG, WBODY, WBODY1, WBODY2, DELCDUX, DELCDUY, DELCDUZ
R0032 STIKFLAG, PRFTRKAT, VINTFLAG, DIMOFLAG, R60FLAG, R61CNTR
0033 33,3772 BANK 33
0034 REF 2 LAST 450 37,2000 SETLOC P20S
0035 37,2207 BANK

0036 REF 4 LAST 206 E6,1412 EBANK= ESTROKER
0037 REF 1 COUNT* \$\$/P20

0038 REF 122 LAST 550 37,2207 0 4555 0 PROG20 TC BANKCALL
0039 REF 1 37,2210 17573 0 CADR R02BOTH
A0040
0041 REF 117 LAST 538 37,2211 3 4714 1 CAP ZERO
0042 REF 3 LAST 180 37,2212 55=128 1 TS TRCKCNT
0043 REF 5 LAST 504 37,2213 55=125 1 TS VHF CNT
0044 REF 19 LAST 503 37,2214 0 5435 0 TC UPFLAG
0045 REF 3 LAST 258 37,2215 00120 1 ADRES PRFTRKAT
0046 REF 23 LAST 444 37,2218 0 5447 0 TC DOWNFLAG
0047 REF 3 LAST 254 37,2217 00026 0 ADRES VEHUPFLG

IMU STATUS CHECK
BLOCKING OF UPLINK IS DONE BY UPLINK PRG

ZERO REND TRACKING MARK COUNTER
ZERO REND VHF RNG MRK COUNTER
SET PREF TRACK ATT FLAG
BIT 10 FLAG 5
LEM TO BE UPDATED. VEHUPFLG RESET.
BIT 8 FLAG 1



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0050	REF	20	LAST	552	37,2220	0 5435 0	TC	UPFLAG	SET TRACKFLAG
0051	REF	3	LAST	502	37,2221	00031 0	ADRES	TRACKFLG	BIT 5 FLAG 1
0052	REF	21	LAST	553	37,2222	0 5435 0	TC	UPFLAG	SET UPDATFLG
0053	REF	13	LAST	551	37,2223	00027 1	ADRES	UPDATFLG	BIT 7 FLAG 1
0054	REF	22	LAST	553	37,2224	0 5435 0	TC	UPFLAG	SET RNDVZFLG
0055	REF	2	LAST	253	37,2225	00010 0	ADRES	RNDVZFLG	BIT 7 FLAG 0
0056	REF	5	LAST	530	37,2226	0 5261 1	TC	2PHSCHNG	
0057					37,2227	00004 0	OCT	00004	
0058					37,2230	05022 1	OCT	05022	
0059					37,2231	26000 0	OCT	26000	
0060	REF	74	LAST	550	37,2232	0 6006 1	TC	INTPRET	
0061					37,2233	77634 0	RTB		
0062	REF	10	LAST	522	37,2234	45505 0		LOADTIME	
0063	REF	2	LAST	78	37,2235	35225 1	STCALL	MARKTIME	
0064	REF	1			37,2236	56343 0		SETINTG	SET INTEGRATION FLAGS
0065					37,2237	43014 0	BOFF	SET	
0066	REF	2	LAST	204	37,2240	02756 1		RNDWFLG	
0067	REF	1			37,2241	76243 0		P20.1	
0068	REF	3	LAST	204	37,2242	01476 0		DIM0FLAG	SET TO INTEGRATE THE W MATRIX
0069					37,2243	43014 0	P20.1	CLEAR	
0070	REF	4	LAST	552	37,2244	00707 1		VHUPFLG	
0071	REF	1			37,2245	76247 1		P20.2	
0072	REF	4	LAST	204	37,2246	01674 0		VINTFLAG	SET FOR LM INTEGRATION
0073					37,2247	77624 1	P20.2	CALL	
0074	REF	3	LAST	204	37,2250	27113 1		INTEGRV	
0075					37,2251	77624 1	CALL		
0076	REF	1			37,2252	56741 0		GRP2PC	GROUP 2 PHASE CHANGE
0077					37,2253	77624 1	CALL		
0078	REF	2	LAST	553	37,2254	56343 0		SETINTG	SET INTEGRATION FLAGS
0079					37,2255	43014 0	BOFF	CLEAR	
0080	REF	5	LAST	553	37,2256	00747 0		VHUPFLG	
0081	REF	1			37,2257	76261 0		P20.3	
0082	REF	5	LAST	553	37,2260	01674 0		VINTFLAG	SET FOR LM INTEGRATION
0083					37,2261	77624 1	P20.3	CALL	
0084	REF	4	LAST	553	37,2262	27113 1		INTEGRV	
0085					37,2263	77776 1	EXIT		
0086	REF	2	LAST	410	37,2264	3 7663 0	CAP	PRI026	
0088	REF	21	LAST	531	37,2265	0 5042 1	TC	PINDVAC	
0089	REF	7	LAST	504	E7,1734		EBANK=	MRKUP2	
0090	REF	2	LAST	207	37,2266	02512 0	2CADR	R22	
0090					37,2267	70067 1			
0092	REF	6	LAST	553	37,2270	0 5261 1	TC	2PHSCHNG	
0093					37,2271	00072 1	OCT	00072	
0094					37,2272	00111 0	OCT	00111	
0095	REF	2	LAST	385	37,2273	3 4761 0	CAP	PRI014	ALLOW HIGHER PRIO THAN LAMBERT
0096	REF	5	LAST	440	37,2274	0 5103 0	TC	PRI0CHNG	
0097	REF	29	LAST	511	37,2275	3 4706 1	CAP	BITS	IS TRACK FLAG SET
0098	REF	33	LAST	224	37,2276	7 0075 1	MASK	STATE +1	
0099					37,2277	0 0006 1	EXTEND		
0100	REF	67	LAST	550	37,2300	1 5112 1	BZF	ENDOFJOB	NO



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0101	REF	18	LAST	336	37,2301	3 4676 1	CAP	BIT13	
0102	REF	34	LAST	553	37,2302	7 0077 0	MASK	STATE +3	IS REFSMPLG SET
0103					37,2303	0 0006 1	EXTEND		
0104	REF	68	LAST	553	37,2304	1 5112 1	BZF	ENDOFJOB	
0107	REF	116	LAST	552	37,2305	3 4714 1	CAP	ZERO	
0106	REF	2	LAST	114	37,2306	55=775 1	TS	R61CNTR	INITIALIZE R61 COUNTER
0111	REF	23	LAST	553	37,2307	0 5435 0	TC	UPFLAG	SET R60FLAG
0112	REF	1			37,2310	00126 1	ADRES	R60FLAG	BIT 4 FLAG 5
0113	REF	123	LAST	552	37,2311	0 4555 0	TC	BANKCALL	
0114	REF	1			37,2312	76536 0	CADR	R61CSM	
0115	REF	24	LAST	552	37,2313	0 5447 0	TC	DOWNFLAG	RESET R60FLAG
0116	REF	2	LAST	554	37,2314	00126 1	ADRES	R60FLAG	BIT 4 FLAG 5
0117	REF	2	LAST	96	E5,1777		EBANK=	QMIN	
0116	REF	2	LAST	236	37,2315	3 4751 0	CAP	EBANKS	
0119	REF	24	LAST	529	37,2316	54 003 0	TS	EBANK	
01191	REF	24	LAST	554	37,2317	0 5435 0	TC	UPFLAG	SET TARGET FLAG TO LEM
01192	REF	2	LAST	364	37,2320	00024 1	ADRES	TARG1FLG	BIT 10 FLAG 1
0120	REF	75	LAST	553	37,2321	0 6006 1	P20R52JB TC	INTPRET	
0121					37,2322	77624 1	CALL		
0122	REF	1			37,2323	30002 0		RS2	SET UP AUTO OPTICS JOB
0123					37,2324	77776 1	EXIT		
0124	REF	124	LAST	554	37,2325	0 4555 0	TC	BANKCALL	
0125	REF	1			37,2326	16070 1	CADR	MARLEES	
0126	REF	66	LAST	530	37,2327	3 4712 1	CAP	ONE	HOLD PRESENT ATTITUDE
0127	REF	4	LAST	409	37,2330	55=332 0	TS	HOLDFLAG	
0128	REF	69	LAST	554	37,2331	0 5112 0	TC	ENDOFJOB	
0129					37,2332	00203 0	OCT203	OCT 00203	
0130	REF	1			7707		FIRST3	EQUALS FIRST3	



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0132 31,2021
0133 REF 1 30,2000
0134 30,2000

0135 REF 12 LAST 276 ES,1751
0136 REF 1

0139 REF 25 LAST 554 30,2000 0 5447 0
01394 REF 3 LAST 553 30,2001 0 0010 0
013941 REF 25 LAST 554 30,2002 0 5435 0
013942 REF 1 30,2003 0 0025 0
01398 REF 125 LAST 554 30,2004 0 4555 0
0140 REF 2 LAST 552 30,2005 17573 0
0141 REF 76 LAST 554 30,2006 0 6006 1
0142 30,2007 77634 0
0143 REF 11 LAST 553 30,2010 45505 0
0145 REF 26 LAST 545 30,2011 34041 0
0146 REF 3 LAST 545 30,2012 27045 0
0147 30,2013 47375 0
0148 REF 13 LAST 545 30,2014 00007 0
0149 REF 17 LAST 545 30,2015 00001 0
0150 30,2016 50256 0
0151 REF 13 LAST 529 30,2017 01744 1
0152 30,2020 77646 0
0153 30,2021 65552 0
0154 REF 7 LAST 485 30,2022 03626 0
0155 30,2023 77414 0
0156 REF 3 LAST 553 30,2024 02676 1
0157 REF 1 30,2025 3 2162 0
0158 REF 126 LAST 555 30,2026 0 4555 0
0159 REF 6 LAST 550 30,2027 20763 1
0160 REF 20 LAST 551 30,2030 0 4106 1
0161 REF 1 30,2031 0 2036 0
0162 30,2032 0 2025 1
0163 REF 17 LAST 517 30,2033 3 6214 0
0164 REF 6 LAST 550 30,2034 0 5415 1
0165 REF 70 LAST 554 30,2035 0 5112 0
0166 REF 1 30,2036 4 2172 0
01661 REF 13 LAST 555 30,2037 7 1751 1
01662 REF 14 LAST 555 30,2040 55751 1
01663 REF 77 LAST 555 30,2041 0 6006 1
01664 30,2042 77614 1
01665 REF 1 30,2043 01664 1
0167 30,2044 43014 0
0168 REF 3 LAST 528 30,2045 00462 1
0169 REF 6 LAST 504 30,2046 04343 1
0170 REF 1 30,2047 60113 1
0171 30,2050 77614 1
0172 REF 3 LAST 451 30,2051 01463 1

BANK 31
SETLOC P20S1
BANK

EBANK= LANDMARK
COUNT* SS/P22

TC DOWNFLAG
ADRES RNDVZPLG
TC UPFLAG
ADRES TARG2PLG
TC BANKCALL
CADR R02BOTH
TC INTPRET
RTB

LOADTIME
STCALL TDEC1

CSMCONIC
VLOAD VXV

VATT
RATT

UNIT DOT
REFSMAT +6

ABS
SL1 ARCCOS

STORE +MGA
CLEAR EXIT

RENDWPLG
CAP V06N45B

TC BANKCALL
CADR GOFASHR

TC GOTOPOOH
TC PROG22A

TC -5
CAP THREE

TC BLANKET
TC ENDOPJOB

CS OCT17000
MASK LANDMARK

TS LANDMARK
TC INTPRET

CLEAR
P22MKPLG

SET ROFF

BRADFLAG
CMOONPLG

PROG22B
SET EARTH

LINAPLAG
MOON

RESET RNDVZPLG BIT 7 FLAG 0

IMU STATUS CHECK
COMPUTE ANGLE BETWEEN Y AND VX R SM

INTEGRATE TO PRESENT TIME
CROSS PRODUCT BETWEEN V AND R

TERM P22
PROC
ENTER

BLANK OUT R1 + R2

SET OFFSET NO.=0

EARTH
MOON



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0174				30,2052	77776 1	EXIT		
0178	REP	1		30,2053	3 2163 1	CAP	V05N7022	
0179	REP	127	LAST	555	30,2054	0 4555 0	TC	BANKCALL
0180	REP	7	LAST	555	30,2055	20763 1	CADR	OCFLASHR
0181	REP	21	LAST	555	30,2056	0 4108 1	TC	GOTOPOOH
0182					30,2057	0 2084 1	TC	+5
0183					30,2060	0 2053 0	TC	-5
0184	REP	9	LAST	517	30,2061	3 4715 0	CAP	FIVE
0185	REP	7	LAST	555	30,2062	0 5415 1	TC	BLANKET
0186	REP	71	LAST	555	30,2063	0 5112 0	TC	ENDOFJOB
01861	REP	10	LAST	556	30,2064	3 4715 0	CAP	FIVE
01862	REP	3	LAST	202	30,2065	54 301 1	TS	MARKINDX
0187	REP	78	LAST	555	30,2066	0 6006 1	TC	INTPRET
0188					30,2067	77624 1	CALL	
0189	REP	1			30,2070	60234 1		UNPACKABE
0190					30,2071	45335 0	SLOAD	DSU
0191	REP	2	LAST	95	30,2072	02745 0		22SUBSCL
0192	REP	1			30,2073	20166 1		P22MAXDE
0193					30,2074	45044 0	BPL	CALL
0194	REP	1			30,2075	60101 1		DE-GR-50
0195	REP	1			30,2076	76333 0		P22SUBRA
0196					30,2077	77650 1	GOTO	
0197	REP	1			30,2100	60120 1		CALLR52
0198					30,2101	77624 1	DE-GR-50 CALL	
0199	REP	1			30,2102	30206 0		ADVORB
01991					30,2103	77776 1	EXIT	
01992	REP	7	LAST	553	30,2104	0 5261 1	TC	2PHSCHNG
01993					30,2105	00004 0	OCT	00004
01994					30,2106	05022 1	OCT	05022
01995					30,2107	13000 0	OCT	13000
01996	REP	79	LAST	556	30,2110	0 6006 1	TC	INTPRET
0200					30,2111	77650 1	GOTO	
0201	REP	1			30,2112	60132 1		DOV5N71
0202					30,2113	43014 0	PROG22R CLEAR	SET
0203	REP	4	LAST	555	30,2114	01663 0		LUNAFLAG
0204	REP	2	LAST	56	30,2115	03067 0		KNOWNPLG
0205					30,2116	77624 1	CALL	
0206	REP	1			30,2117	60217 0		P22SUBRB
0207					30,2120	77776 1	CALLR52	EXIT
02111	REP	8	LAST	556	30,2121	0 5261 1	TC	2PHSCHNG
02112					30,2122	00004 0	OCT	00004
02113					30,2123	05022 1	OCT	05022
02114					30,2124	13000 0	OCT	13000
0212	REP	11	LAST	556	30,2125	3 4715 0	CAP	FIVE
0213	REP	4	LAST	556	30,2126	54 301 1	TS	MARKINDX
0217	REP	80	LAST	556	30,2127	0 6006 1	TC	INTPRET
0218					30,2130	77624 1	CALL	
0219	REP	2	LAST	554	30,2131	30002 0		R52
0220					30,2132	77776 1	DOV5N71	EXIT
0221	REP	1			30,2133	3 2164 0	CAP	V05N7122

TERMINATE
PROCEED UNPACK ABCDE
RECYCLE
IMMEDIATE RETURN BLANK OUT R1,R2

UNPACK ABCDE FROM LANDMARK

DE GREATER THAN MAX
SUBROUTINE A SETS LAT/LONG/ALT

CALL ADVANCED ORBIT ROUTINE

EARTH ORBIT

GET LAT/LONG/ALT FROM ASTRO

SET MARK INDEX=5 FOR R52



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0222	REP	126	LAST	556	30,2134	0 4555 0	TC	BANKCALL	
0223	REP	6	LAST	556	30,2135	20763 1	CADR	GOFLASHR	
0224	REP	22	LAST	556	30,2136	0 4106 1	TC	GOTOPOCH	
0225					30,2137	0 2144 1	TC	+5	TERMINATE
0226					30,2140	0 2133 1	TC	-5	PROCEED UNPACK ABCDE
0227	REP	12	LAST	556	30,2141	3 4715 0	CAF	FIVE	RECYCLE
0228	REP	6	LAST	556	30,2142	0 5415 1	TC	BLANKET	IMMEDIATE ENTRY BLANK OUT R1,R3
0229	REP	72	LAST	556	30,2143	0 5112 0	TC	ENDOPJOB	
0230	REP	61	LAST	556	30,2144	0 6006 1	TC	INTPRET	
0231					30,2145	77624 1	CALL		
0232	REP	2	LAST	556	30,2146	60234 1		UNPACKAE	
0233					30,2147	77624 1	CALL		SET LAT/LONG/ALT
0234	REP	2	LAST	556	30,2150	76333 0		P22SUBRA	
0235					30,2151	66744 0	PROG22C	LXC,2	SLOAD*
0236	REP	29	LAST	447	30,2152	01330 0		MARKSTAT	
0237	REP	11	LAST	504	30,2153	77724 0		QPRET,2	
0238	REP	3	LAST	175	30,2154	36750 0	STCALL	8NN	
0240	REP	1			30,2155	60255 0		S22.1	ESTABLISH LANDMARK - COMPUTE ORBITAL
0241					30,2156	77776 1	P22OVER	EXIT	
02411	REP	27	LAST	536	30,2157	0 5301 0	TC	PHASCHNG	
02412					30,2160	04022 0	OCT	04022	
0242	REP	2	LAST	555	30,2161	0 2036 0	TC	PROG22A	POINT A ON GSOP
0243					30,2162	01455 1	V06N45B	VN	0645
0244					30,2163	01306 0	V05N7022	VN	00570
0245					30,2164	01307 1	V05N7122	VN	00571
0246					30,2165	00033 1	P22MAXDE	2DEC	27 R-14
0246					30,2166	00000 1			
0247					30,2167	01531 1	V06N69	VN	00689
0248					30,2170	00077 1	OCTL77	OCT	77
0249					30,2171	00700 0	OCTL700	OCT	700
0250					30,2172	07000 0	OCTL7000	OCT	7000
02505	REP	3	LAST	552	37,2000		SETLOC	P20S	
02506					37,2333		BANK		
0251					37,2333	43020 1	P22SUBRA	STD	BOFF
0252	REP	2	LAST	123	37,2334	03667 0		S22TOFF	SET LAT/LONG/ALT FOR KNOWN LANDMARK
0253	REP	3	LAST	556	37,2335	03347 1		KNOWNFLG	
0254	REP	3	LAST	557	37,2336	03667 0		S22TOFF	UNKNOWN LANDMARK, EXIT
0255					37,2337	46135 1	SLOAD	RHIZ	
0256	REP	3	LAST	556	37,2340	02745 0		22SUBSCL	
0257	REP	1			37,2341	60213 1		OBTAINIL	GET LAT/LONG/ALT FROM ASTRO
0258					37,2342	50025 0	DSU	RAN	
0259	REP	1			37,2343	21646 0		9DWID	2 R-14
0260	REP	1			37,2344	60173 1		S22LSITE	GET LAT/LONG/ALT FROM RLS (LANDING SITE)
0261					37,2345	70152 0	SL1	LXC,1	GET LAT/LONG/ALT FROM TABLES
0262	REP	247	LAST	550	37,2346	00154 1		MPAC	
0263					37,2347	70801 1	SETPD	DLOAD*	
0264					37,2350	00001 0		OD	
0265	REP	1			37,2351	23705 1		ALTTAB,1	
0266					37,2352	64723 0	PDDI*	PDDI*	

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0267	REF	1			37,2353	23623 1		LONOTAB,1	
0268	REF	1			37,2354	23541 0		LATTAB,1	
0269					37,2355	77668 1	VDEF		
0270	REF	7	LAST	528	37,2356	35104 1	STCALL	LAT	
0271	REF	4	LAST	557	37,2357	03667 0	S22TOPP		EXIT
02715	REF	2	LAST	555	30,2000		SETLOC	P20S1	
02716					30,2173		BANK		
0272					30,2173	77634 0	S22LSITE	RTB	CONVERT RLS FROM MOON-FIXED TO BASIC REF
0273	REF	12	LAST	555	30,2174	45505 0		LOADTIME	
02731					30,2175	24007 0	STOVL	6D	6-7D= TIME
02732	REF	5	LAST	510	30,2176	02026 1		RLS	
02733					30,2177	14001 0	STODL	6D	0-5D= LANDING SITE VECTOR
02734	REF	4	LAST	440	30,2200	15330 0		HIDPHALF	MPAC= ANY NON-ZERO FOR MOON
02735					30,2201	77624 1	CALL		
02736	REF	1			30,2202	55341 1		RP-TO-R	RLS IN BASIC REF B-27 IN MPAC
02737					30,2203	77742 0	VSR2		LUNARFLAG AND ERADFLAG SET ABOVE
0274	REF	3	LAST	451	30,2204	02152 0	STORE	ALPHA V	SCALE RL5 B-29 FOR LAT-LONG
0275					30,2205	77634 0	RTB		
0276	REF	13	LAST	556	30,2206	45505 0		LOADTIME	SET PRESENT TIME IN MPAC FOR LAT-LONG
0277					30,2207	77624 1	CALL		
0278	REF	2	LAST	451	30,2210	26322 0		LAT-LONG	
0279					30,2211	77650 1	GOTO		
0280	REF	5	LAST	556	30,2212	03667 0		S22TOPP	EXIT
0281					30,2213	77624 1	OBTAINLL	CALL	GET LAT/LONG/ALT FROM ASTRO
0282	REF	2	LAST	556	30,2214	60217 0		P22SUBRB	
0283					30,2215	77650 1	GOTO		
0284	REF	6	LAST	558	30,2216	03667 0		S22TOPP	EXIT
0285					30,2217	77420 1	P22SUBRB	STQ	GET LAT/LONG/ALT FROM ASTRO
0286	REF	7	LAST	556	30,2220	03670 0		S22TOPP +1	
0287	REF	1			30,2221	3 3656 1	CAP	V06N69B	
0288	REF	129	LAST	557	30,2222	0 4555 0	TC	BANKCALL	
0289	REF	18	LAST	550	30,2223	20624 0	CADR	GOFASH	
0290	REF	23	LAST	557	30,2224	0 4108 1	TC	GOTOPOOH	TERMINATE
0291					30,2225	0 2227 1	TC	+2	PROCEED
0292					30,2226	0 2221 1	TC	-5	ENTER OR RECYCLE
0293	REF	82	LAST	557	30,2227	0 6008 1	TC	INTPRET	
0294					30,2230	77624 1	CALL		
0295	REF	1			30,2231	61345 1		LLASRDA	
0296					30,2232	77650 1	GOTO		
0297	REF	8	LAST	556	30,2233	03670 0		S22TOPP +1	EXIT
0298					30,2234	77776 1	UNPACKAE	EXIT	UNPACK LANDMARK INTO ABCDE
0299	REF	15	LAST	555	30,2235	3 1751 0	CA	LANDMARK	
0300	REF	1			30,2236	7 2170 1	MASK	OCTL77	
0301	REF	4	LAST	557	30,2237	55*744 0	TS	22SURSCIL	DEL=LMK ID NO. N 00,01, 02-26
0302	REF	16	LAST	556	30,2240	3 1751 0	CA	LANDMARK	
0303	REF	2	LAST	555	30,2241	7 2172 0	MASK	OCTL7000	
0304	REF	2	LAST	95	30,2242	55*745 1	TS	OXOFF	B± OFFSET INDICATOR
0305	REF	26	LAST	555	30,2243	0 5435 0	TC	UPFLAG	SET KNOWNFLG
0306	REF	4	LAST	557	30,2244	00141 0	ADRES	KNOWNFLG	RIT 8 FLAG 6



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0307	REF	17	LAST	558	30,2245	3 1751 0
0308	REF	36	LAST	417	30,2246	7 4675 0
0309					30,2247	0 0006 1
0310					30,2250	1 2253 0
0311	REF	26	LAST	555	30,2251	0 5447 0
0312	REF	5	LAST	558	30,2252	00141 0
0313	REF	63	LAST	556	30,2253	0 6006 1
0314					30,2254	77616 0

CA	LANDMARK
MASK	BIT14
EXTEND	
BZF	+3
TC	DOWNFLAG
ADRES	KNOWNFLG
TC	INTPRET
RVD	

IF BIT14 OF LANDMARK=1,A=2 OTHERWISE A=1

A=1 LEAVE KNOWNFLAG SET FOR KNOWN LMK
A=2 CLEAR KNOWNFLG (BIT 8 FLAG 6) FOR
UNKNOWN LMK



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P0315 PROGRAM NAME- OPTICS CALIBRATION ROUTINE

R0316 MOD NO- 1

R0317 MOD BY- TOM KNATT

R0318

R0319 FUNCTIONAL DESCRIPTION- TO MEASURE THE EFFECT OF SOLAR RADIATION ON
R0320 THE SXT TRUNNION ANGLE AND TO STORE THE MEASURED TRUNNION BIAS FOR P23

R0321

R0322 CALLING SEQUENCE- CALL

R0323

R57

R0324

R0325 SUBROUTINES CALLED- DISPLAY ROUTINES

R0326

R0327 NORMAL EXIT MODES-VIA EGRESS

R0328

R0329 ALARMS- NONE

R0330

R0331 ABORT MODES- P23ABORT IF MARKING SYSTEM OR EXTENDED VERR ACTIVE

R0332 INPUT- NONE REQUIRED, NORMALLY CALLED BY P23

R0333 OUTPUT- TRUNNION BIAS ANGLE- ANGLE DETERMINED WHEN SHAFT LINE OF SIGHT

R03332 (SLOS) AND LANDMARK LINE OF SIGHT (LLOS) ARE SUPERIMPOSED. THIS ANGLE

R03334 MAY NOT BE EXACTLY ZERO BECAUSE OF UNEVEN HEATING OF THE OPTICS, FOR

R03336 EXAMPLE.

R0334

R0335 ERASABLE INITIALIZATION REQUIRED- MRK(RUP1, EXTTRACT

R0336

R0337 DEBRIS- RUPTREGS USED BY MARKRUPT AND ERASABLES USED BY DISPLAYS

0338 33,3772

BANK 33

0339 REP 4 LAST 557 37,2000

SETLOC P20S

0340 37,2360

BANK

0341 REP 1

COUNT# 55/R57

0342 REP 20 LAST 277 E7,1725

ERANK= MRK(RUP1

0343 37,2360 77420 1 R57

STO EXIT

0344 REP 2 LAST 88 37,2361 02317 0

EGRESS

03442 REP 3 LAST 434 37,2362 3 4753 0

CAP ERANK7

03444 REP 25 LAST 554 37,2363 54 003 0

TS ERANK

0345 REP 19 LAST 518 37,2364 3 6211 0

CAP SIX

0346 REP 16 LAST 511 37,2365 7 1044 1

MASK EXTTRACT

0347 REP 143 LAST 530 37,2366 10 000 0

CCS A

0348 REP 1 37,2367 0 2437 0

TC P23ABRT

0349 REP 23 LAST 509 37,2370 3 4711 1

CAP BIT2

0350 REP 17 LAST 560 37,2371 27*044 1

ADS EXTTRACT

0351 REP 27 LAST 558 37,2372 0 5435 0 R57A

TC UPFLAG

0352 REP 1 37,2373 00116 1

ADRES V59FLAG

0353 REP 1 37,2374 3 2442 1

CAP V59NB

0354 REP 130 LAST 558 37,2375 0 4555 0

TC BANKCALL

0355 REP 1 37,2376 20504 1

CADR GOMARKFR

0356 REP 24 LAST 558 37,2377 0 4106 1

TC GOTOPOOH

0357 REP 1 37,2400 0 2424 1

TC ENDR57

0358 REP 2 LAST 560 37,2401 0 2424 1

TC ENDR57

0359 REP 10 LAST 368 37,2402 3 4716 0

CAP SEVEN

BIT2 = MARKING SYSTEM IN USE
BIT3 = EXTENDED VERR IN PROGRESSSET, THEREFORE ABORT
NOT SET
SET IT
SET V59FLAG (BIT 12 FLAG 5) TO INDICATE
CALIBRATION MARK

TERMINATE



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0360	REP	9	LAST	557	37,2403	0 5415 1	TC	BLANKET
0361	REP	73	LAST	557	37,2404	0 5112 0	TC	ENDOFJOB
0362	STORE							
0363	REP	1			37,2405	3 2441 1	MARDISP	CAP
0364	REP	131	LAST	560	37,2408	0 4555 0	TC	V08N87C3
0365	REP	2	LAST	560	37,2407	20504 1	CADR	BARCALL
0366	REP	25	LAST	560	37,2410	0 4108 1	TC	G04AR0P2
0367	REP	1			37,2411	0 2416 0	TC	G07OP00H
0368	REP	1			37,2412	0 2372 0	TC	R57B
0369	REP	13	LAST	557	37,2413	3 4715 0	TC	R57A
0370	REP	10	LAST	561	37,2414	0 5415 1	CAP	FIVE
0371	REP	74	LAST	561	37,2415	0 5112 0	TC	BLANKET
03712	REP	1			37,2416	3 2444 1	TC	ENDOFJOB
03714	REP	61	LAST	533	37,2417	54 001 1	CA	19.77DEC
0372	REP	21	LAST	560	37,2420	3 1732 0	TS	L
037245					37,2421	0 0006 1	CA	MRKUP1 +5
03725	REP	62	LAST	561	37,2422	20 001 1	EXTEND	
0373	REP	1			37,2423	55+342 1	MSU	L
0376	REP	27	LAST	559	37,2424	0 5447 0	TS	TRUNBIAS
0377	REP	2	LAST	560	37,2425	00116 1	TC	DOWNFLAG
03772	REP	3	LAST	554	37,2426	3 4751 0	ADRES	V59FLAG
03774	REP	28	LAST	560	37,2427	54 003 0	CAP	BRANKS
03776	REP	3	LAST	553	37,2430	3 4761 0	TS	BRANK
03777	REP	16	LAST	509	37,2431	0 5027 1	CAP	PRI014
03778	REP	30	LAST	557	1330		TC	NOVAC
037785	REP	2	LAST	227	37,2432	05423 1	BRANK=	MARKSTAT
037785					37,2433	04062 1	2CADR	ENDMARK
0378	REP	84	LAST	559	37,2434	0 6008 1	TC	INTPRET
0379					37,2435	77650 1	GOTO	
0380	REP	3	LAST	560	37,2436	02317 0	EGRESS	
0381	REP	3	LAST	217	37,2437	0 5604 0	P23ABRT	TC
0382					37,2440	01211 1	OCT	01211
0383					37,2441	01527 0	V06N67NB	VN
0384					37,2442	16600 0	V59NB	VN
0385					37,2443	14600 1	V51NB	VN
03852					37,2444	61740 0	19.77DEC	OCT

BLANK OUT R1,R2,R3

TERMINATE
PROCEED
ENTER (RECYCLE)

BLANK OUT R1,R3

PUT FIXED INTO ERASABLE FOR MSU
INSTRUCTION COMING UP
CONTAINS TRUNNION

CORRECTS TRUNBIAS FROM 2xS TO 1xS

RESET V59FLAG
BIT 12 FLAG 5

THIS JOB CLEARS BIT IN

MARKING IN R57 SO R53 CAN TAKE OVER



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P0386 PROGRAM DESCRIPTION
R0387 MOD NO - 1
R0388 MOD BY - N.BRODEUR
R0389 FUNCTIONAL DESCRIPTION

R0390
R0391 TO PERFORM SIGHTING MARKS IN CONJUNCTION WITH THE RENDEZVOUS NAVIG-
R0392 ATION PROGRAM. CALLED BY ASTRONAUT VIA EXTENDED VERB
R0394 CALLING SEQUENCE -

R0395 R21 VIA V 57
R0396 R23 VIA V 54

R0399 SUBROUTINES CALLED -

R0400 FLAGUP FLAGDOWN BANKCALL

R0401 ENDOPJOB GOMARK2 GOMARKF

R04011 INTPRET GENTRAN KLEENEX

R04012 ENDMARK

R0402 NORMAL EXIT MODES-

R0403 MARKRUPT USED BY SXTMARK HAS BEEN MODIFIED TO STORE MARK IN MRKBUF2

R0404 FOR USE BY R22. WHEN ASTRONAUT IS FINISHED TAKING MARKS, HE HITS AN

R0405 PROCEED, R21 IS TERMINATED THUS CAUSING THE FINAL MARK TO BE TRANSPD

R04051 TO MRKBUF2 FOR PROCESSING BY R22

R0408 ALARM OR ABORT EXIT MODES -

R0407 NONE

R0408 OUTPUT -

R0409 7 REGISTER MRKBUF2 CONTAINING TIME2, TIME1, CDUY, OPTICS X, CDUZ, OPTICS Y,

R0410 CDUX.

R0411 ERASABLE INITIALIZATION REQUIRED

R0412 FLAGS SET AND RESET

R0413 R21MARK (COMMUNICATION TO MARKRUPT TO STORE MARKS IN MRKBUF1 + 2)

R0414 R23FLG INDICATES COAS MARKING

R0415 DEBRIS .

0416 REF 22 LAST 561 E7,1725 EBANK= MRKBUF1
0417 REF 1 37,2000 SETLOC RENDEZ
0418 37,2445 BANK

0419 REF 1 COUNT* 55/R21

0420	REF	28	LAST	560	37,2445	0 5435 0	R21CSM	TC	UPFLAG	SET R21MARK
0421	REF	2	LAST	195	37,2448	00037 0		ADRES	R21MARK	BIT 14 FLAG 2
0422	REF	12	LAST	504	37,2447	3 7716 0	R23CSM	CA	NEGONE	
0423	REF	23	LAST	562	37,2450	55-725 1		TS	MRKBUF1	
0424	REF	8	LAST	553	37,2451	55-734 1		TS	MRKBUF2	
0427	REF	12	LAST	446	37,2452	3 0075 0		CA	FLAGWRD1	
0428	REF	19	LAST	539	37,2453	7 4702 1		MASK	BIT9	TEST R23FLG
0429					37,2454	0 0008 1		EXTEND		
0430	REF	1			37,2455	1 2510 0		RZP	R21C1	NOT SET REGULAR R21 MARKING
0431	REF	1			37,2456	3 2535 0		CAP	V0694	R23 BACKUP MARKING
0432	REF	132	LAST	581	37,2457	0 4555 0		TC	BANKCALL	DISPLAY SHAFT + TRUNNION
0433	REF	5	LAST	496	37,2460	20465 1		CADR	GOMARKF	
0434	REF	1			37,2461	0 2527 0		TC	R21END	TERM
0435					37,2462	0 2464 0		TC	+2	PROC

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0436			37,2463	0 2456 1		TC	-5	ENTER
0437	REF	1	37,2464	3 2534 1	R23CSM1	CAP	V53	PERFORM ALT LOS SIGHT MARK
0438	REF	133	37,2465	0 4555 0		TC	BANKCALL	
0439	REF	1	37,2466	20470 0		CADR	GOMARK2	
0440	REF	2	37,2467	0 2527 0		TC	R21END	V34-TERMINATE R23
0441	REF	1	37,2470	1 2516 0		TCP	R21CSMA	PROCEED-END BACK UP MARKING (R23)
0442	REF	20	37,2471	3 6211 0		CAP	SIX	TRANSFER MRKBUP1 TO MRKBUP2
0443	REF	7	37,2472	0 5475 1		TC	GENTRAN	
0444	REF	24	37,2473	01725 0		ADRES	MRKBUP1	
0445	REF	9	37,2474	01734 0		ADRES	MRKBUP2	
0451			37,2475	0 0006 1		EXTEND		
0452	REF	17	37,2476	3 0025 0		DCA	TIME2	
0453	REF	25	37,2477	53*726 1		DXCH	MRKBUP1	READ TIME
0454	REF	4	37,2500	3 0033 1		CA	CDUY	READ CDU ANGLES
0455	REF	28	37,2501	55*727 0		TS	MRKBUP1 +2	
0456	REF	8	37,2502	3 0034 0		CA	CDUZ	
0457	REF	27	37,2503	55*731 1		TS	MRKBUP1 +4	
0458	REF	11	37,2504	3 0032 0		CA	CDUX	
0459	REF	28	37,2505	55*733 0		TS	MRKBUP1 +6	
0464			37,2506	0 0003 1		RELINT		
0465	REF	1	37,2507	0 2464 0		TC	R23CSM1	
0466	REF	1	37,2510	3 2443 0	R21C1	CAP	V51NB	
0467	REF	134	37,2511	0 4555 0		TC	BANKCALL	
0468	REF	2	37,2512	20470 0		CADR	GOMARK2	
0469	REF	3	37,2513	0 2527 0		TC	R21END	V34-TERMINATE R21
0470	REF	2	37,2514	1 2516 0		TCP	R21CSMA	PROCEED-END R21
0471	REF	2	37,2515	1 2510 0		TCP	R21C1	RECYCLE
0473	REF	29	37,2516	3 1725 0	R21CSMA	CA	MRKBUP1	IF -1 NO MARK
0474	REF	67	37,2517	6 4712 1		AD	ONE	
0475			37,2520	0 0006 1		EXTEND		
0476	REF	4	37,2521	1 2527 1		BZF	R21END	ZERO = NO MARK
0476	REF	21	37,2522	3 6211 0		CAP	SIX	MARK THEREFORE TRANSFER IT TO MRKBUP2
0479	REF	8	37,2523	0 5475 1	R21CSM1	TC	GENTRAN	TRANSFER MRKBUP1 TO MRKBUP2
0480	REF	30	37,2524	01725 0		ADRES	MRKBUP1	
0481	REF	10	37,2525	01734 0		ADRES	MRKBUP2	
0482			37,2528	0 0003 1		RELINT		
0487	REF	135	37,2527	0 4555 0	R21END	TC	BANKCALL	
0488	REF	2	37,2530	20464 0		CADR	KLEENEX	
04881	REF	26	37,2531	0 5447 0		TC	DOWNFLAG	RESET R21MARK
04882	REF	3	37,2532	00037 0		ADRES	R21MARK	BIT 14 FLAG 2
0491	REF	3	37,2533	0 5423 1		TC	ENDMARK	END MARKING AND ENDJOB
0494			37,2534	15200 1	V53	VN	5300	
0495			37,2535	01536 0	V0694	VN	0694	

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P0496 PREFERRED TRACKING ATTITUDE ROUTINE R61CSM

R0497 PROGRAM DESCRIPTION

R0498 MOD NO - 2

R0499 MOD BY - N. BRODEUR

R0500 FUNCTIONAL DESCRIPTION-

R0501 TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM TO ENABLE OPTICS

R0502 TRACKING OF THE LM AND TO PERFORM THE MANEUVER TO THE PREFERRED

R0503 OR X-AXIS TRACKING ATTITUDE.

R0504 CALLING SEQUENCE-

R0505 TC BANKCALL

R0506 CADR R61CSM

R0507 SUBROUTINES CALLED

R0508 MAKECADR BANKCALL

R0509 INTPRET FLAGUP FLAGDOWN

R0510 BANKJUMP CRS61.1 R60CSM

R0511 PHASCHNG

R0512 NORMAL EXIT MODES-

R0513 NORMAL RETURN IS TO CALLER + 1

R0517 OUTPUT -

R0518 SEE OUTPUT FOR CRS61.1 d ATTITUDE MANEUVER ROUTINE (R60CSM)

R0519 ERASABLE INITIALIZATION REQUIRED

R0520 GENRET USED TO SAVE Q FOR RETURN

R0521 R61CNTR MUST BE PRESET TO ZERO

R0522 FLAGS SET + RESET

R0523 3-AXIS FLAG

R0524 DEBRIS

R0525 SEE SUBROUTINES

0527 REP 3 LAST 114 E6,1770

0528 REP 1 EBANK= GENRET

COUNT* \$\$/R61

ROUTINES - NAVIGATION - PREF. TR. 9TT=

0529 REP 9 LAST 529 37,2536 3 4752 0 R61CSM

CAP EBANK6

SWITCH TO EBANK 6

0530 REP 27 LAST 561 37,2537 56 003 1

XCH EBANK

SAVE EBANK

0531 REP 2 LAST 113 37,2540 55*771 0

TS SAVBNK

0532 REP 2 LAST 383 37,2541 0 4604 I

TC MAKECADR

0533 REP 4 LAST 564 37,2542 55*770 1

TS GENRET

0534 REP 3 LAST 554 37,2543 11*775 I

CCS R61CNTR

TEST R61CNTR

0535 REP 1 37,2544 0 2575 1

TC DECRM61

NOT READY TO DO R61.

0536 37,2545 0 2547 0

TC +2

DO R61

0537 REP 2 LAST 564 37,2546 0 2576 1

TC DECRM61 +1

0538 REP 85 LAST 561 37,2547 0 6006 1

TC INTPRET

0539 37,2550 77624 1

CALL

0540 REP 1 37,2551 71225 I

CRS61.1

LOS DETERMINATION + VRH ATTITUDE

0541 37,2552 77776 I

EXIT

0542 REP 248 LAST 557 37,2553 50 154 1

INDEX MPAC

0543 37,2554 0 2555 0

TC +1

0544 REP 1 37,2555 0 2574 0

TC R61END

SUBROUTINE DRIVING DAP (EXIT R61)

OR AUTO MODE NOT SET (EXIT R61)

OR STIKFLAG SET (EXIT R61)

RESET 3-AXIS FLAG

BIT 6 FLAG 5

A05441

A05442

0545 REP 29 LAST 563 37,2556 0 5447 0 R61C1

TC DOWNFLAG

0553 REP 3 LAST 391 37,2557 00124 0

ADRES 3AXISFLAG



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0554	REP	68	LAST	563	37,2560	4 4712 0	CS	ONE	SET R61CNTR NEG. TO INDICATE KALCMANU
0555	REP	4	LAST	564	37,2561	55-775 1	TS	R61CNTR	
0556	REP	29	LAST	562	37,2562	0 5435 0	TC	UPFLAG	SET FLAG FOR PROIRITY DISPLAYS FOR R60
0557	REP	2	LAST	384	37,2563	00077 1	ADRES	PDSPFLAG	BIT 12 FLAG 4
0558	REP	136	LAST	563	37,2564	0 4555 0	TC	BANKCALL	
0559	REP	2	LAST	391	37,2565	58000 1	CADR	R60CSM	
0560	REP	30	LAST	564	37,2566	0 5447 0	TC	DOWNFLAG	RESET FLAG FOR PRIORITY DISPLAYS IN R60
0561	REP	3	LAST	565	37,2567	00077 1	ADRES	PDSPFLAG	BIT 12 FLAG 4
0564	REP	28	LAST	557	37,2570	0 5301 0	TC	PHASCHNG	
0565					37,2571	00111 0	OCT	00111	
05651	REP	119	LAST	554	37,2572	3 4714 1	CAP	ZERO	
05652	REP	3	LAST	564	37,2573	0 2575 1	TC	DECRM61	
0567	REP	18	LAST	555	37,2574	3 6214 0	R61END	CAP	THREE
0568	REP	5	LAST	565	37,2575	55-775 1	DECRM61	TS	R61CNTR
0569	REP	5	LAST	564	37,2576	31-770 0	CAE	GENRET	
0570	REP	144	LAST	560	37,2577	22 000 1	LXCH	A	RETURN IS IN L
0571	REP	3	LAST	564	37,2600	3 1771 1	CA	SAVBANK	RESTORE EBANK
0572	REP	28	LAST	564	37,2601	56 003 1	XCH	EBANK	
0573	REP	145	LAST	565	37,2602	22 000 1	LXCH	A	RETURN IS NOW BACK IN A
0574	REP	6	LAST	384	37,2603	0 4577 0	TC	BANKJUMP	EXIT R61
0575					13,2178		BANK	13	
0576	REP	1			23,2000		SETLOC	P20S2	
0577					23,3047		BANK		
0576	REP	31	LAST	563	E7,1725		EBANK=	MRKBUF1	



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P0579 BVECTOR PERFORMS COMPUTATIONS FOR
R0580 DELTAQ, THE MEASURED DEVIATION BASED ON THE DIFFERENCE BETWEEN THE CSM-LE
R0581 M STATE VECTOR ESTIMATES AND THE ACTUAL TRACKING MEASUREMENT.
R0582 US, THE MODIFIED FICTITIOUS STAR DIRECTION VECTOR
R0583 GEOMETRY VECTOR B ASSOCIATED WITH EACH TRACKING MEASUREMENT.
R0584 INPUT
R0585 UM, 1/2 UNIT VECTOR ALONG THE CSM-LM LINE OF SIGHT (BASIC REF. SYSTEM)
R0586 USTAR, FICTITIOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0587 RCLP, RELATIVE CSM TO LM POSITION VECTOR
R0588 OUTPUT
R0589 USTAR, MODIFIED FICTITIOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0590 BVECTOR = 9 DIMENSIONAL BVECTOR (1/2 UNIT VEC.)
R0591 DELTAQ = MEASURED DEVIATION
R0592 CALLING SEQUENCE
R0593 L CALL BVECTORS
R0594 NORMAL EXIT
R0595 L+1 OF CALLING SEQUENCE

0596	REF	1				COUNT	23/20SUB	
0597				23,3047	77620 0	BVECTORS	STO	
0598	REF	4	LAST	561	23,3050	02317 0	EGRESS	
0599				23,3051	53575 0	VLOAD	UNIT	
0600	REF	2	LAST	119	23,3052	03531 0	RCLP	RELATIVE POSITION VECTOR
0601				23,3053	14033 1	STOOL	26D	RCLP UNIT VEC
0602				23,3054	00045 0		36D	RCLP ABS VALUE
0603	REF	1		23,3055	25301 1	STOVL	TEMPOR1	MOVE TO SAFE LOCATION
0604	REF	2	LAST	78	23,3056	01245 0	USTAR	
0605				23,3057	53435 0	VXV	UNIT	
0606				23,3060	00033 1		26D	USTAR = UNIT(US X UCL)
0607	REF	3	LAST	119	23,3061	37502 1	STCALL	BVECTOR
0608	REF	2	LAST	553	23,3062	56741 0	GRP2PC	PHASE CHANGE
0609				23,3063	77775 1	VLOAD		
0610	REF	4	LAST	566	23,3064	03502 0	BVECTOR	
0611	REF	3	LAST	566	23,3065	01245 0	STORE	USTAR
0612				23,3066	72441 0	DOT	SL1	
0613	REF	2	LAST	78	23,3067	01235 1	UM	USTAR DOT UM
0614				23,3070	45326 1	ACOS	DSU	
0615	REF	3	LAST	393	23,3071	15322 0	DP1/4TH	
0616				23,3072	41301 0	NORM	DMP	
0617	REF	17	LAST	549	23,3073	00047 1	X1	
0618	REF	1		23,3074	07107 0		PI/4.0	
0619				23,3075	53605 1	DMP	SRR*	
0620	REF	2	LAST	566	23,3076	01301 1	TEMPOR1	RCLP ABS VALUE
0621				23,3077	21576 0		0 -3,1	ADJUST SCALING
0622	REF	2	LAST	119	23,3100	27524 1	STOVL	DELTAQ
0623	REF	8	LAST	535	23,3101	15332 1	ZEROVECS	
0624	REF	5	LAST	566	23,3102	03510 0	STORE	BVECTOR +6
0625	REF	6	LAST	566	23,3103	03516 0	STORE	BVECTOR +12D
0626				23,3104	77650 1	GOTO		



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0627	REF	5	LAST	566	23,3105	02317	0	EXPRESS
0628					23,3106	31103	1	PI/4.0 2DEC .785398164
0628					23,3107	36652	0	



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P0629 GETUM-DETERMINES THE LINE OF SIGHT UNIT VECTOR UM IN THE BASIC REFERENC
R0630 E COORDINATE SYSTEM FROM THE OPTICS SHAFT AND TRUNNION ANGLES AND THE IM
R0631 U GINGAL ANGLES.
R0632 INPUT
R0633 MARKDATA, BASE ADDRESS OF MARK DATA
R0634 REPSMAT, ROTATION MATRIX FROM STABLE MEMBER TO BASIC REF. COORD. SYSTEM

R0635 SUBROUTINES CALLED-
R0636 SXTNB - SECT. ANGULAR READINGS TO NAV. BASE COOR.
R0637 NBSM - TRANSFORM FROM NAV. BASE TO STABLE MEMBER
R0638 OUTPUT
R0639 MPAC = LINE OF SIGHT 1/2 UNIT VECTOR IN BASIC REFERENCE SYSTEM
R0640 CALLING SEQUENCE
R0641 L CALL GETUM

R0642 NORMAL EXIT
R0643 L+1 OF CALLING SEQUENCE

0644				23,3110	40220 0	GETUM	STO	SETPD	
0645	REP	6	LAST	567	23,3111	02317 0		EGRESS	
0646				23,3112	00001 0			0	
0647				23,3113	76740 0		LXC,1	VLOAD*	
0648	REP	2	LAST	78	23,3114	01242 1		MARKDATA	CONTAINS ADDRESS OF MARK DATA
0649				23,3115	00002 0			1,1	
0650	REP	7	LAST	222	23,3116	23676 1	STOOL*	MARKDOWN +1	TRANSFER DATA FROM WORKING STORAGE TO MARKDOWN ARRAY FOR DOWNLINK
0651				23,3117	00001 0			0,1	
0652	REP	8	LAST	568	23,3120	03675 0	STORE	MARKDOWN	
0653				23,3121	77774 0		AXT,2		
0654				23,3122	00002 0			2	
0655				23,3123	67084 1		XSU,2	SXA,2	
0656	REP	18	LAST	568	23,3124	00046 0		X1	X1 = MARKDATA
0657	REP	6	LAST	431	23,3125	00050 1		S1	S1 = MARKDATA(ADR) +2
0658				23,3126	77624 1		CALL		
0659	REP	3	LAST	501	23,3127	46000 0		SXTNB	SECT. ANGULAR READINGS TO NAV. BASE COOR.
0660				23,3130	77624 1		CALL		
0661	REP	1			23,3131	47541 1		NBSM	TRANSFORM FROM NAV. BASE TO STABLE MEM.
0662				23,3132	76505 0		VCM	VSL1	
0663	REP	14	LAST	555	23,3133	01736 1		REPSMAT	
0664				23,3134	77650 1		GOTO		MPAC = (UM) LINE OF SIGHT VECTOR
0665	REP	7	LAST	568	23,3135	02317 0		EGRESS	EXIT



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P0686 RENDEZVOUS TRACKING DATA PROCESSING ROUTINE (R22)

R0687 PURPOSE (1) TO PROCESS RENDEZVOUS SIGHTING MARK DATA TO UPDATE THE STATE VECTOR OF EITHER THE CSM OR LM AS
R0689 DEFINED BY THE RENDEZVOUS NAVIGATION PROGRAM (P20).

R0870 ASSUMPTIONS (1) THIS ROUTINE IS MANUALLY SELECTED BY THE ASTRONAUT BY V55E WHENEVER RENDEZVOUS SIGHTING MARKS
R0872 ARE DESIRED. ITS SELECTION HOWEVER IS LIMITED TO PERIODS WHEN THE CMC IS HOLDING FOR A V/N FLASHING
R0874 DATA DISPLAY. THIS ROUTINE RETURNS TO THE ORIGINAL PROGRAM AT THE INTERRUPTED DISPLAY.

0878 34,2512 BANK 34
0877 REF 1 34,2000 SETLOC P20S3
0878 34,2512 BANK

0679 REF 1 COUNT 34/R22

0680 REF 3 LAST 553 34,2512 3 7663 0 R22 CAP PRI028
0681 REF 2 LAST 198 34,2513 55<058 1 TS PHSPROT2
06811 REF 8 LAST 553 34,2514 0 5103 0 TC PRI0CHNG
0682 REF 1 34,2515 3 7714 1 CA NEG3
0683 REF 11 LAST 583 34,2518 55<734 1 TS MRKBUF2
0684 REF 68 LAST 584 34,2517 0 8008 1 TC INTPRET
0685 34,2520 77634 0 RTB
0687 REF 14 LAST 558 34,2521 45505 0 LOADTIME
0688 REF 2 LAST 171 34,2522 01152 0 STORE VHPTIME PRESENT TIME
0689 34,2523 77624 1 REND1 CALL
0690 REF 3 LAST 586 34,2524 56741 0 GRP2PC
06901 34,2525 77824 1 CALL
0691 REF 1 34,2526 56404 1 WAITONE
0692 34,2527 77776 1 REND1A EXIT
0700 REF 12 LAST 569 34,2530 3 1734 0 CA MRKBUF2
0701 34,2531 0 0006 1 EXTEND
0702 REF 1 34,2532 1 2535 1 BZF REND2
0703 34,2533 0 0006 1 EXTEND
0704 REF 1 34,2534 6 2554 1 BZMF REND3A
0705 REF 22 LAST 563 34,2535 3 6211 0 REND2 CAP SIX
0706 REF 9 LAST 563 34,2536 0 5475 1 TC GENTRAN
0707 REF 13 LAST 569 34,2537 01734 0 ADRES MRKBUF2
0708 REF 3 LAST 553 34,2540 01224 1 ADRES MARKTIME
0716 REF 2 LAST 569 34,2541 3 7714 1 CAP NEG3
0719 REF 14 LAST 589 34,2542 55<734 1 TS MRKBUF2
0720 34,2543 0 0003 1 RELINT
0721 REF 67 LAST 569 34,2544 0 8008 1 TC INTPRET
0722 34,2545 45014 0 CLEAR CALL
0723 REF 1 34,2548 04867 1 SOURCEPLG
0724 REF 4 LAST 589 34,2547 56741 0 GRP2PC
0725 34,2550 52131 0 SSP GOTO
0726 REF 3 LAST 588 34,2551 01243 0 MARKDATA
0727 REF 2 LAST 78 34,2552 01224 1 ECADR VTEMP -2
0728 REF 1 34,2553 70577 0 REND4
0729 REF 88 LAST 569 34,2554 0 8008 1 REND3A TC INTPRET
0732 34,2555 77824 1 REND3 CALL

0 = OPTICS DATA
PHASE CHANGE



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07321	REP	5	LAST	569	34,2556	58741 0		CALL	GRP2PC	
07322					34,2557	77624 1			WAITONE	
0733	REP	2	LAST	569	34,2560	58404 1		BOFF		
0734					34,2561	77614 1			VHPRFLAG	
0736	REP	4	LAST	256	34,2562	04746 0			REND1A	
0737	REP	1			34,2563	70527 0		RTS		
0738					34,2564	77634 0			LOADTIME	PRESENT TIME
0739	REP	15	LAST	569	34,2565	45505 0		DSU	DSU	
0740					34,2566	45225 0			60SECDP	1 MIN
0741	REP	1			34,2567	14647 1			VHFTIME	LAST READING OF RADAR
0742	REP	3	LAST	569	34,2570	01152 0		BNN	CALL	
0743					34,2571	45040 1			REND1A	
0744	REP	2	LAST	570	34,2572	70527 0			RANGERO	READ RADAR RANGE
0745	REP	1			34,2573	58415 1		DLOAD		
0746					34,2574	77745 1			MARKTIME	
0747	REP	4	LAST	569	34,2575	01225 0		STORE	VHFTIME	FOR DOWNLINK
0748	REP	4	LAST	570	34,2576	01152 0		CALL		
0749					34,2577	77624 1	REND4		SETINTG	SET INTEGRV FLAGS
0750	REP	3	LAST	553	34,2600	56343 0		BON	CALL	
0751					34,2601	45014 0			VEHUPFLG	
0752	REP	6	LAST	553	34,2602	00707 1			CSMUPP	BRANCH IF CSM UPDATE
0753	REP	1			34,2603	71034 0			INTEGRV	
0754	REP	5	LAST	553	34,2604	27113 1		CALL		
0755					34,2605	77624 1			GRP2PC	PHASE CHANGE
0756	REP	6	LAST	570	34,2606	56741 0		CALL		
0757					34,2607	77624 1			SETINTG	SET INTEGRV FLAGS
0758	REP	4	LAST	570	34,2610	56343 0		CLEAR		
0759					34,2611	77614 1			VINTFLAG	SET INTEGRATION VEHICLE TO LM
0760	REP	6	LAST	553	34,2612	01674 0		BOFF	SET	
0761					34,2613	43014 0	REND5		RENDWFLG	
0762	REP	4	LAST	555	34,2614	02756 1			REND5A	DO NOT INTEGRATE W IF FLAG = 0
0763	REP	1			34,2615	70617 0			DIM0FLAG	
0764	REP	4	LAST	553	34,2616	01476 0		CALL		
0765					34,2617	77624 1	REND5A		INTEGRV	
0766	REP	6	LAST	570	34,2620	27113 1		CALL		
0767					34,2621	77624 1			SHIFTNDX	SET EARTH MOON SCALING INDEX
0768	REP	1			34,2622	56526 0		CALL	CMPOS	SET CSM POSITION
0769					34,2623	77624 1			CALL	
0770	REP	1			34,2624	71123 1		SET	INCORFLG	SET FOR 1ST PASS
0771					34,2625	45014 0			LMPOS	SET LM POSITION
0772	REP	1			34,2626	02464 0			BON	
0773	REP	1			34,2627	71132 1		CLEAR	ORBWFLG	CLEAR FOR ORBITAL AND CUSINAR
0774					34,2630	43014 0			RENDWFLG	
0775	REP	3	LAST	257	34,2631	01871 0			REND6	
0776	REP	5	LAST	570	34,2632	02716 0		DLOAD	WRENDPOS	
0777	REP	1			34,2633	70643 1			0	0 = WRENDPOS 1= WRENDVRI.
0778					34,2634	77745 1		STCALL	INITIALW	INITIALIZE W MATRIX
07781	REP	1			34,2635	02001 1				
07782					34,2636	34001 1				
0779	REP	1			34,2637	56544 1				



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07791				34,2840	77745 1	DLOAD		
07792	REF	9	LAST	588	34,2841	15332 1		ZEROVECS
07793	REF	6	LAST	552	34,2842	01126 0	STORE	VHPCNT
0780				34,2843	77614 1	REND6	SET	ZERO OUT VHPCNT AND TRMKCNT
0781	REF	6	LAST	570	34,2844	02476 0		RENDWFLG
0782				34,2845	52375 1		VLOAD	VSU
0783	REF	2	LAST	78	34,2846	01215 0		LENPOS
0784	REF	2	LAST	78	34,2847	01207 0		CSMPOS
0785	REF	3	LAST	566	34,2850	03531 0	STORE	RCPL
0786				34,2851	43056 0	REND7	UNIT	LM - CSM
0787	REF	2	LAST	569	34,2852	04707 0		BON
0788	REF	1			34,2853	71045 0		SOURCPLG
0789	REF	1			34,2854	01273 0	REND14	BRANCH IF DATA IS RADAR
0790				34,2855	45014 0		STORE	UCL
0791	REF	2	LAST	570	34,2856	02744 1	BOFF	CALL
0792	REF	1			34,2857	70871 0		INCORPLG
0793	REF	1			34,2860	47110 1		REND9
0794	REF	3	LAST	588	34,2861	25235 1	GETUM	CALCULATE UM LINE OF SIGHT
0795	REF	2	LAST	571	34,2862	01273 0	STOVL	UM
0796				34,2863	40035 0		UCL	
0797	REF	4	LAST	571	34,2864	01235 1	VXV	BOV
0798	REF	1			34,2865	70866 0		UM
0799				34,2866	40056 0	REND8	UNIT	REND8
0800	REF	1			34,2867	70555 0		BOV
0801	REF	4	LAST	566	34,2870	01245 0	REND3	BRANCH IF OVERFLOW IGNORE MARK
0802				34,2871	77624 1	REND9	STORE	USTAR
0803	REF	1			34,2872	47047 1	CALL	
0804				34,2873	77214 0		BON	BVECTORS
0805	REF	7	LAST	570	34,2874	00707 1		VLOAD
0806	REF	1			34,2875	70701 0		VEHUPFLG
0807	REF	7	LAST	566	34,2876	03502 0	REND9A	REND9A
0808				34,2877	77676 0		BVECTOR	BVECTOR
0809	REF	6	LAST	571	34,2700	03502 0	VCOMP	
0810				34,2701	77624 1	REND9A	STORE	BVECTOR
08101	REF	7	LAST	570	34,2702	56741 0	CALL	
08102				34,2703	77614 1			GRP2PC
0811	REF	3	LAST	251	34,2704	00706 0	BON	
0812	REF	1			34,2705	71076 0		R23PLG
0813				34,2706	43345 1			REND15
0814	REF	1			34,2707	31220 0	DLOAD	DAD
0815	REF	1			34,2710	31222 1		SKTVAR
0816	REF	2	LAST	119	34,2711	27526 0	REND10	IMVAR
0817	REF	4	LAST	571	34,2712	03531 0	STOVL	VARIANCE
0818				34,2713	60246 1		RCPL	TEMP STORAGE FOR VARIANCE CALC.
0819	REF	19	LAST	566	34,2714	00047 1	ABVAL	NORM
0820				34,2715	41316 0			X1
0821	REF	3	LAST	571	34,2716	03528 0	DSO	DMP
0822				34,2717	45070 1			VARIANCE
0823	REF	20	LAST	571	34,2720	00048 0	XAD,1	CALL
0824	REF	2	LAST	570	34,2721	58526 0		X1
							SHIPTDX	GET EARTH MOON SCALING INDEX



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0825				34,2722	56070 0	XAD,1	XAD,1	
0826	REP	7	LAST	546	34,2723	00047 1	X2	
0827	REP	8	LAST	572	34,2724	00047 1	X2	
0828					34,2725	72257 1	SR*	TLOAD
0829					34,2726	20577 0		0 -2,1
0830	REP	249	LAST	564	34,2727	00155 0		MPAC
0831	REP	4	LAST	571	34,2730	03526 0	STORE	VARIANCE
08311					34,2731	54335 0	SLOAD	SR
083114	REP	2	LAST	90	34,2732	02400 1		INTVAR
083118					34,2733	20632 1		25D
083122					34,2734	47171 0	TAD	RTB
083126	REP	5	LAST	572	34,2735	03526 0		VARIANCE
083128	REP	1			34,2736	45562 1		TFMODE
08313	REP	6	LAST	572	34,2737	03526 0	STORE	VARIANCE
0832					34,2740	76214 1	BOFF	TAD
0833	REP	3	LAST	571	34,2741	04747 1		SOURCEFLG
0834	REP	1			34,2742	70751 0		REND10A
0835	REP	1			34,2743	03005 1		RVARMIN
0836					34,2744	72244 0	BPL	TLOAD
0837	REP	2	LAST	572	34,2745	70751 0		REND10A
0838	REP	2	LAST	572	34,2746	03005 1		RVARMIN
08381					34,2747	77646 0	ABS	
0839	REP	7	LAST	572	34,2750	03526 0	STORE	VARIANCE
0840					34,2751	45014 0	REND10A	CLEAR
0841	REP	1			34,2752	02666 0		DMENFLG
0842	REP	1			34,2753	75250 1		INCORP1
08421					34,2754	77624 1	CALL	
08422	REP	8	LAST	571	34,2755	56741 0		GRP2PC
0843					34,2756	45014 0	BOFF	CALL
0844	REP	3	LAST	571	34,2757	02744 1		INCORFLG
0845	REP	1			34,2760	71006 1		REND12
0846	REP	3	LAST	571	34,2761	56526 0		SHIPINDX
0847					34,2762	51575 1	VLOAD	ABVAL
0848	REP	5	LAST	76	34,2763	01265 1		DELTAX +6
0849					34,2764	77657 0	SR*	
0850					34,2765	57176 0		0,2
0851	REP	4	LAST	275	34,2766	27504 0	STOVL	N49DISP +2
0852	REP	6	LAST	572	34,2767	01257 0		DELTAX
0853					34,2770	53646 0	ABVAL	SR*
0854					34,2771	57176 0		0,2
0855	REP	5	LAST	572	34,2772	03502 0	STORE	N49DISP
08551					34,2773	77735 0	SLOAD	
0856	REP	1			34,2774	02003 0		RMAX
0857					34,2775	45261 0	SR	DSJ
0858					34,2776	20613 1		10D
0859	REP	6	LAST	572	34,2777	03502 0		N49DISP
0860					34,3000	67240 0	RVN	SLOAD
0861	REP	1			34,3001	71141 0		RENDISP
0862	REP	1			34,3002	02004 1		VMAX
0863					34,3003	50025 0	DSJ	RVN

ADJUST SCALING TO B-40

INTEGRATION VARIANCE SCALED B-15
SCALE IT B-40

BRANCH IF NOT VHF RADAR

VHF RADAR MIN. VARIANCE

MIN. VALUE WAS STORED AS NEG.
STORE MIN. VALUE

CLEAR FOR 6 X 6 W MATRIX
CALCULATE UPDATE

GET EARTH MOON SCALING INDEX

BRANCH IF POS UP GREATER THAN MAX.



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0864	REP	7	LAST	572	34,3004	03504 0				N49DISP +2	
0865	REP	2	LAST	572	34,3005	71141 0				RENDISP	BRANCH IF VEL.UPDATE GREATER THAN MAX.
0866					34,3006	77624 1	REND12	CALL			
0869	REP	1			34,3007	75462 0				INCORP2	INCORPORATE UPDATE VALUES INTO STATE VEC
0870					34,3010	43014 0		BCN		BOFF	
0871	REP	4	LAST	572	34,3011	04707 0				SOURCEFLG	
0872	REP	1			34,3012	71103 0				REND16	BRANCH IF DATA IS RADAR
0873	REP	4	LAST	572	34,3013	02744 1				INCORFLG	
0874	REP	1			34,3014	71111 0				REND17	
0875					34,3015	77624 1		CALL			
0876	REP	4	LAST	572	34,3016	56526 0				SHIPTNDX	GET EARTH MOON SCALING INDEX
0877					34,3017	45014 0		BCN		CALL	
0878	REP	8	LAST	571	34,3020	00707 1				VEHUPFLG	
0879	REP	1			34,3021	71117 0				REND18	BRANCH IF CSM UPDATE
0880	REP	2	LAST	570	34,3022	71132 1				LMPOS	GET LM POSITION
0881					34,3023	77624 1	REND13	CALL			
0882	REP	9	LAST	572	34,3024	56741 0				GRP2PC	PHASE CHANGE
0883					34,3025	52375 1		VLOAD		VSU	
0884	REP	3	LAST	571	34,3026	01215 0				LEMPOS	
0885	REP	3	LAST	571	34,3027	01207 0				CSMPOS	
0886	REP	5	LAST	571	34,3030	03531 0		STORE		RCLP	LM - CSM
0887					34,3031	77614 1		CLRG0			
0888	REP	5	LAST	573	34,3032	02624 0				INCORFLG	
0869	REP	1			34,3033	70651 1				REND7	BRANCH FOR 2ND PASS THIS OPTICS MARK
0890					34,3034	45014 0	CSMUPP	CLEAR		CALL	
0891	REP	7	LAST	570	34,3035	01674 0				VINTFLAG	SET INTEGRATION VEHICLE EQ LM
0892	REP	7	LAST	570	34,3036	27113 1				INTEGRV	
0893					34,3037	77624 1		CALL			
0894	REP	10	LAST	573	34,3040	56741 0				GRP2PC	PHASE CHANGE
0895					34,3041	77624 1		CALL			
0896	REP	5	LAST	570	34,3042	56343 0				SETINTG	SET FLAGS FOR INTEGRATION
0897					34,3043	77650 1		GOTO			
0898	REP	1			34,3044	70613 1				REND6	
0899	REP	9	LAST	571	34,3045	27502 0	REND14	STOVL		BVECTOR	VHF RADAR BVECTOR
0900	REP	10	LAST	571	34,3046	15332 1				ZEROVECS	
0901	REP	10	LAST	573	34,3047	03510 0		STORE		BVECTOR +6	
0902	REP	11	LAST	573	34,3050	27516 0		STOVL		BVECTOR +12D	
0903	REP	6	LAST	573	34,3051	03531 0				RCLP	
0904					34,3052	71256 0		UNIT		DLOAD	
0905	REP	1			34,3053	01257 0				VHFRANGE	VHFRANGE SCALED R-27
0906					34,3054	60414 0		BCN		SR2	
0907	REP	7	LAST	510	34,3055	04303 0				MOONTHIS	
0908					34,3056	71057 0				+1	
0909					34,3057	43025 1		DSU		SET	
0910					34,3060	00045 0				36D	ABVAL (RCLP)
0911	REP	6	LAST	573	34,3061	02464 0				INCORFLG	
0912	REP	3	LAST	566	34,3062	03524 1		STORE		DELTAQ	
0913					34,3063	77214 0		BOFF		VLOAD	
0914	REP	9	LAST	573	34,3064	00747 0				VEHUPFLG	
0915	REP	1			34,3065	71071 1				REND14A	



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0916	REP	12	LAST	573	34,3066	03502 0		BVECTOR	
0917					34,3067	77676 0	VCOMP		
0918	REP	13	LAST	574	34,3070	03502 0	STORE	BVECTOR	
0919					34,3071	77624 1	CALL		
09191	REP	11	LAST	573	34,3072	56741 0	REND14A		
09192					34,3073	52145 0	DLOAD	GRP2PC	
0920	REP	1			34,3074	03003 1		GOTO	
0921	REP	1			34,3075	70711 1		RVAR	
0922					34,3076	43335 0	REND15	REND10	
0923	REP	1			34,3077	01357 1	SLOAD	DAD	GET ALT LOS VARIANCE
0924	REP	2	LAST	571	34,3100	31222 1		ALTVAR	BACKUP OPTICS
0925					34,3101	77650 1		IMUVAR	IMU VARIANCE
0926	REP	2	LAST	574	34,3102	70711 1	GOTO		
0927					34,3103	62150 1	REND16	REND10	
0928	REP	7	LAST	571	34,3104	01125 0	LXA,1	INCR,1	
0929					34,3105	00001 0		VHPCNT	VHF RADAR UPDATE COUNT
0930					34,3106	52130 1	DEC	1	
0931	REP	6	LAST	574	34,3107	01125 0	SXA,1	GOTO	
0932	REP	1			34,3110	70523 1		VHPCNT	UPDATE COUNT
0933					34,3111	62150 1	REND17	REND1	
0934	REP	4	LAST	552	34,3112	01126 0	LXA,1	INCR,1	
0935					34,3113	00001 0		TRMKCNT	OPTICS MARK COUNT
0936					34,3114	52130 1	DEC	1	
0937	REP	5	LAST	574	34,3115	01126 0	SXA,1	GOTO	
0938	REP	2	LAST	571	34,3116	70555 0		TRMKCNT	UPDATE COUNT
0939					34,3117	77624 1	REND18	REND3	
0940	REP	2	LAST	570	34,3120	71123 1	CALL		
0941					34,3121	77650 1		CMPOS	GET CSM POSITION
0942	REP	1			34,3122	71023 0	GOTO		
0943					34,3123	53775 1	CMPOS	REND13	
0944	REP	1			34,3124	01573 1	VLOAD	VSR#	
0945					34,3125	57167 0		DELTA CSM	
0946					34,3126	77655 1		7,2	
0947	REP	1			34,3127	01607 1	VAD		
0948	REP	4	LAST	573	34,3130	01207 0		RCVCSM	
0949					34,3131	77616 0	STORE	CSMPOS	CSM POSITION SCALED R-27 OR R-29
0950					34,3132	53775 1	RVO		
0951	REP	1			34,3133	01645 1	LMPOS	VLOAD	
0952					34,3134	57167 0		VSR#	
0953					34,3135	77655 1		DELTALEM	
0954	REP	1			34,3136	01661 1	VAD	7,2	
0955	REP	4	LAST	573	34,3137	01215 0		RCVLEM	
0956					34,3140	77616 0	STORE	LEMPOS	LM POSITION SCALED R-27 OR R-29
0963					34,3141	77776 1	RVO		
0964	REP	6	LAST	496	34,3142	3 0105 0	RENDISP	EXIT	
0965	REP	22	LAST	436	34,3143	7 4703 0	CA	FLAGWRD9	
0966					34,3144	0 0006 1	MASK	BIT8	
0967					34,3145	1 3150 1	EXTEND		
0968	REP	24	LAST	560	34,3146	3 4711 1	RZF	+3	
0969					34,3147	0 3151 1	CA	BIT2	
							TC	+2	



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0970	REF	37	LAST	509	34,3150	3 4712 1	CA	BIT1	
0971	REF	8	LAST	573	34,3151	55=505 1	TS	N49DISP +4	
09711	REF	120	LAST	565	34,3152	3 4714 1	CAP	ZERO	SET TEMPOR1 5 ZERO TO INDICATE
09712	REF	3	LAST	566	34,3153	55=300 1	TS	TEMPOR1	V06 N49 DISPLAY HASNT BEEN ANSWERED
09713	REF	29	LAST	565	34,3154	0 5301 0	TC	PHASCHNG	
09714					34,3155	04022 0	OCT	04022	
09715	REF	1			34,3156	3 7664 1	CAP	PRI027	SET UP DISPLAY JOB WITH HIGHER PRIORITY
09716	REF	17	LAST	561	34,3157	0 5027 1	TC	NOVAC	
097165	REF	32	LAST	565	E7,1725		EBANK=	MRKBUP1	THAN PRESENT JOB
09717	REF	1			34,3160	03172 0	2CADR	RENDISP2	
09717	REF	1			34,3161	70067 1			
097175	REF	89	LAST	569	34,3162	0 6006 1	RENDISP7	TC	INTPRET
097177	REF	250	LAST	572	34,3163	00155 0		STORE	MPAC
097179					34,3164	53135 0		SLOAD	BZE
097181	REF	4	LAST	575	34,3165	01301 1		TEMPOR1	
097183	REF	1			34,3166	71163 0		RENDISP7 +1	DISPLAY HAS NOT BEEN ANSWERED YET
097185					34,3167	52040 1	BVN	GOTO	
097187	REF	2	LAST	572	34,3170	71006 1		REND12	NEG INDICATES PROCEED
097189	REF	1			34,3171	71201 1		RENDISP3	POS INDICATES RECYCLE
0972	REF	1			34,3172	3 3223 1	RENDISP2	CAP	V06N49
0973	REF	137	LAST	565	34,3173	0 4555 0	TC	BANKCALL	
0974	REF	1			34,3174	20635 0	CADR	PRICDSP	
0975	REF	2	LAST	365	34,3175	0 4550 0	TC	GOTOV56	TERM EXIT P20 VIA V56
0976	REF	69	LAST	565	34,3176	4 4712 0	CS	ONE	NEG INDICATES PROCEED RENDISP7 JOB
0977	REF	5	LAST	575	34,3177	55=300 1	TS	TEMPOR1	POS INDICATES RECYCLE RENDISP7 JOB
0978	REF	75	LAST	561	34,3200	0 5112 0	TC	ENDOFJOB	GO COMPLETE ABOVE JOB
0986					34,3201	77614 1	RENDISP3	BCN	
0988	REF	5	LAST	573	34,3202	04707 0		SOURCEFLG	
0989	REF	2	LAST	574	34,3203	70523 1		REND1	DATA WAS RADAR GO LOOK FOR OPTICS NEXT
0990					34,3204	77776 1	EXIT		
0991	REF	33	LAST	575	E7,1725		EBANK=	MRKBUP1	
0992					34,3205	0 0004 0	INHINT		
0993	REF	1			34,3206	3 3224 0	CAP	BUFFRANK	
0994	REF	13	LAST	413	34,3207	54 006 0	TS	BBANK	
0995	REF	13	LAST	562	34,3210	3 7716 0	CA	NEGONE	
0996	REF	34	LAST	575	34,3211	55=725 1	TS	MRKBUP1	ERASE MARK ONE BUFFER
0997	REF	15	LAST	569	34,3212	55=734 1	TS	MRKBUP2	ERASE MARK TWO BUFFER
0998					34,3213	0 0003 1	RELINT		
0999	REF	90	LAST	575	34,3214	0 6006 1	RENDISP4	TC	INTPRET
1000					34,3215	77650 1		GOTO	
1001	REF	3	LAST	574	34,3216	70555 0		REND3	
1002					34,3217	00052 0	SXTVAR	2DEC	0.04 E-6 B+16 SXT ERROR VARIANCE = .04 (MR)SO
1002					34,3220	38307 0			
1003					34,3221	00052 0	IMJVAR	2DEC	0.04 E-6 B+16 IMJ ERROR VARIANCE = .04 (MR)SO
1003					34,3222	38307 0			
1008					34,3223	01461 0	V06N49	VN	0649
1009	REF	35	LAST	575	E7,1725		EBANK=	MRKBUP1	
1010	REF	2	LAST	575	34,3224	70067 1	BUFFRANK	BBCON	RENDISP3
1011					31,2021		BANK	31	
1012	REF	1			27,2000		SETLOC	R22S1	



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1013				27,2343		BANK			
1014				27,2343	45020 1	SETINTG	STQ	CALL	
1015	REP	8	LAST	568	27,2344			EGRESS	
1016	REP	14	LAST	511	27,2345			INTSTALL	RESERVE INTEGRATION
1017				27,2346	43145 0		DLOAD	SET	
1018	REP	5	LAST	570	27,2347			MARKTIME	
1019	REP	1			27,2350			STATEPLG	
1020	REP	27	LAST	555	27,2351		STORE	TDEC1	MARKTIME
1021				27,2352	43014 0		CLEAR	CLEAR	
1022	REP	8	LAST	503	27,2353			INTYPPLG	PRECISION INTEGRATION
1023	REP	5	LAST	570	27,2354			DIM0PLG	
1024				27,2355	43014 0		SET	CLRCO	
1025	REP	8	LAST	573	27,2356			VINTFLAG	SET VEHICLE EQ. CSM
1026	REP	1			27,2357			D6OR9PLG	SET W MATRIX DIM. EQ 6
1027	REP	9	LAST	576	27,2360			EGRESS	EXIT
1028				27,2361	77620 0	CONTRK	STQ		
1029	REP	2	LAST	77	27,2362			POINTEX	
10291				27,2363	77614 1	CONTRK	BOFF		
10292	REP	3	LAST	529	27,2364			REFSMPLG	BRANCH TO END OF JOB IF REFSMAT NO GOOD
10293	REP	1			27,2365			ENDPLAC	
1030				27,2366	50135 0		SLOAD	RNN	
10301	REP	8	LAST	565	27,2367			R81CNTR	
10302	REP	1			27,2370			WAITONE1	
10303				27,2371	43014 0		BOV	BOFF	IS TRACK FLAG SET
1031	REP	14	LAST	553	27,2372			UPDATPLG	
1032	REP	3	LAST	576	27,2373			POINTEX	
1033	REP	4	LAST	553	27,2374			TRACKPLG	
1034	REP	2	LAST	576	27,2375			ENDPLAC	
1035				27,2376	77776 1		EXIT		
1036	REP	30	LAST	575	27,2377	0 5301 0	REDOR22	TC	PHASCHNG
1037				27,2400	00132 1			OCT	00132
1038	REP	4	LAST	569	27,2401	3 7663 0		CAF	PRIO26
1039	REP	7	LAST	569	27,2402	0 5103 0		TC	PRIOCHNG
1040	REP	3	LAST	570	27,2403	0 2407 0		TC	WAITONE +3
1041				27,2404	77620 0		WAITONE	STQ	
1042	REP	4	LAST	576	27,2405	01150 1			POINTEX
10421				27,2406	77776 1		WAITONE1	EXIT	
1043	REP	2	LAST	139	27,2407	3 4740 0		CAF	4SECS
1044	REP	138	LAST	575	27,2410	0 4555 0		TC	BANKCALL
1045	REP	7	LAST	536	27,2411	01732 0		CADR	DELAYJOB
1046	REP	91	LAST	575	27,2412	0 6006 1		TC	INTPRET
1047				27,2413	77650 1			GOTO	
1048	REP	1			27,2414	56363 1		CONTRK	CHECK AGAIN NOW
1049				27,2415	77776 1		RANGERD	EXIT	
1050				27,2416	0 0004 0			INHINT	
1051	REP	1			27,2417	4 2472 0		CS	OCT17
1052				27,2420	0 0006 1			EXTEND	
1053	REP	6	LAST	361	27,2421	03 013 0		WAND	CHAN13
1054	REP	1			27,2422	3 4334 1		CAF	OCT11
1055				27,2423	0 0006 1			EXTEND	



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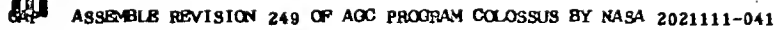
1056	REP	7	LAST	576	27,2424	05 013 0	WOR	CHAN13	GENERATE SHIFT PULSES TO RADR, SET R.BIT
1057					27,2425	0 0003 1	RELINT		
1058					27,2426	0 0006 1	EXTEND		
1059	REP	18	LAST	563	27,2427	3 0025 0	DCA	TIME2	
1080	REP	6	LAST	578	27,2430	53*225 1	DXCH	MARKTIME	READ PRESENT TIME
1081	REP	139	LAST	578	27,2431	0 4555 0	TC	BANKCALL	
1062	REP	1			27,2432	17514 1	CADR	RADSTALL	WAIT FOR RANGE COMPLETE
1063	REP	1			27,2433	0 2461 0	TC	LIGHTON	BAD DATA GOOD BIT
10835	REP	2	LAST	256	27,2434	0 5520 0	TC	TRFAILOF	TURN TRACKER LIGHT OFF
1085	REP	92	LAST	576	27,2435	0 6008 1	RANGERD1 TC	INTPRET	
1086					27,2436	50135 0	SLOAD	RMV	
1087	REP	2	LAST	123	27,2437	03704 1		RM	
10671	REP	1			27,2440	56447 0		RANGERD3	
1088					27,2441	77805 1	DMP		
1089	REP	1			27,2442	18475 0		CONVRNCE	CONVERT RANGE TO METERS B-27
10891					27,2443	77814 1	RANGERD2 SET		
1070	REP	6	LAST	575	27,2444	04487 0		SOURCEPLG	SOURCE OF DATA TO VHF RADAR
1071	REP	2	LAST	573	27,2445	01257 0	STORE	VHFPRANGE	
1072					27,2446	77816 0	RVO		
10721					27,2447	77776 1	RANGERD3 EXIT		
10722	REP	251	LAST	575	27,2450	3 0154 1	CA	MPAC	
10723	REP	13	LAST	538	27,2451	7 4872 1	MASK	POS-MAX	
10724	REP	252	LAST	577	27,2452	54 154 0	TS	MPAC	MASK OUT NEG. SIGN BIT
10725	REP	93	LAST	577	27,2453	0 8008 1	TC	INTPRET	
1073					27,2454	77805 1	DMP		
10731	REP	2	LAST	577	27,2455	18475 0		CONVRNCE	CONVERT FROM NM TO METERS AND SCALE B-27
10732					27,2456	52015 1	DAD	GOTO	
10733	REP	1			27,2457	16471 1		RANGER14	VALUE IN METERS OF SIGN BIT SCALED B-27
10734	REP	1			27,2460	56443 1		RANGERD2	
10738	REP	1			27,2461	0 5532 0	LIGHTON TC	TRFAILOF	TURN TRACKER LIGHT ON
107406	REP	94	LAST	577	27,2462	0 8006 1	TC	INTPRET	
10741					27,2463	77745 1	DLOAD		
10742	REP	7	LAST	577	27,2464	01225 0		MARKTIME	
10743	REP	5	LAST	570	27,2465	01152 0	STORE	VHFTIME	
1075					27,2466	77650 1	GOTO		
1076	REP	3	LAST	575	27,2467	70523 1		REND1	
10781					27,2470	00045 0	RANGER14 2DEC	303431.7 B-27	16384 X 18.52 SCALED B-27
10761					27,2471	01217 1			
1077					27,2472	00017 1	OCT17 OCT	00017	
10781					27,2473	40200 1	OC40200 OCT	40200	
1079					27,2474	00045 0	CONVRNCE 2DEC	18.52 B-13	VHF INPUT RANGE CONV. FROM .01 NM TO M
1079					27,2475	01217 1			
1080					27,2478	0 0006 1	VHFREAD EXTEND		
1061	REP	9	LAST	388	27,2477	04 007 1	ROR	SUPERBANK	MUST SAVE BANK BECAUSE OF RUPT
1082	REP	5	LAST	539	27,2500	54 018 1	TS	BANKRUPT	EXITS VIA TASKOVER BADEND OR GOODEND
10621	REP	121	LAST	575	27,2501	4 4714 0	CS	ZERO	
10822	REP	2	LAST	72	27,2502	54 734 0	TS	RUPTAGN	
1083					27,2503	0 0008 1	EXTEND		
1084	REP	5	LAST	539	27,2504	22 012 1	QXCH	ORUPT	
10841	REP	34	LAST	439	27,2505	3 4704 0	CAP	BIT7	



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10842	REF	35	LAST	554	27,2506	7 0075 1	MASK	STATE +1	UPDATE FLAG
10843					27,2507	0 0006 1	EXTEND		
10844	REF	1			27,2510	1 2520 0	BZF	BYPASS	
1085	REF	1			27,2511	3 0046 0	CA	RNRAD	
1086	REF	3	LAST	577	27,2512	55*703 0	TS	RM	SAVE RANGE
1087	REF	25	LAST	574	27,2513	3 4711 1	CAP	BIT2	
1088					27,2514	0 0006 1	EXTEND		
1089	REF	5	LAST	162	27,2515	02 033 0	RAND	CHAN33	READ DATA GOOD BIT
1094					27,2516	0 0006 1	EXTEND		
1095	REF	1			27,2517	1 2523 0	BZF	VHFGOOD	BRANCH IF DATA GOOD BIT EQUALS GOOD
1096	REF	30	LAST	550	27,2520	3 4711 1	BYPASS	CAP	TWO
1097	REF	37	LAST	530	27,2521	0 4574 0	TC	POSTJUMP	
1098	REF	1			27,2522	17464 1	CADR	BADEND	
1099	REF	31	LAST	578	27,2523	3 4711 1	VHFGOOD	CAP	TWO
1100	REF	36	LAST	578	27,2524	0 4574 0	TC	POSTJUMP	
1101	REF	2	LAST	227	27,2525	17467 1	CADR	GOODEND	
1102					27,2526	43174 1	SHIFINDX	AXT,2	BCN
1103					27,2527	00000 1			0
1104	REF	10	LAST	573	27,2530	00707 1			VERUPFLG
1105	REF	1			27,2531	56537 0			SHIFTA
1106					27,2532	43414 1	BCN	RVO	VEHICLE IS CSM
1107	REF	2	LAST	32	27,2533	04304 1			LMOONFLG
1108					27,2534	56535 1			+1
1109					27,2535	43514 0	INCR,2	RVO	
1110					27,2536	77775 1	DEC	-2	
1111					27,2537	43414 1	SHIFTA	BCN	RVO
1112	REF	7	LAST	555	27,2540	04303 0			CMOONFLG
1113					27,2541	56542 1			+1
1114					27,2542	43514 0	INCR,2	RVO	MOON ORB.
1115					27,2543	77775 1	DEC	-2	
1116					27,2544	66370 0	INITIALW	AXT,1	SSP
1117					27,2545	00044 1			36D
1118	REF	7	LAST	566	27,2546	00051 0			S1
1119					27,2547	00006 1			6
1120					27,2550	77775 1	VLOAD		
1121	REF	11	LAST	573	27,2551	15332 1			ZEROVECS
1122	REF	5	LAST	261	27,2552	06445 1	INITA	STORE	W +36D,1
1123					27,2553	76100 1			TIx,1
1124	REF	1			27,2554	56552 0			AXT,1
11241					27,2555	00044 1			INITA
11242	REF	6	LAST	578	27,2556	06533 1	INITB	STORE	W +90D,1
11243					27,2557	67300 0			36D
11244	REF	1			27,2560	56556 1			SLOAD
1125					27,2561	00001 0			INITB
1127	REF	7	LAST	578	27,2562	02401 0			0
1126	REF	6	LAST	576	27,2563	02411 1	STORE	W	POSITION VALUE
1129	REF	9	LAST	578	27,2564	02421 1	STORE	W +8D	INITIALIZE DIAGONAL W POSITION
1130					27,2565	77735 0	STORE	W +16D	
1131					27,2566	00002 0	SLOAD		
1132	REF	10	LAST	578	27,2567	02511 0			1
							STORE	W +72D	VELOCITY VALUE
									INITIALIZE DIAGONAL W VELOCITY



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1133	REF	11	LAST	578	27,2570	02521 0		STORE	W +80D
1134	REF	12	LAST	579	27,2571	02531 1		STORE	W +88D
1135					27,2572	77616 0		RVD	
R1138					.				



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P1137
R1138 CRS61.1 4/10/68
R1139 TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R1140 OPTICS TRACKING OF THE LM AND LM TRACKING OF THE CSM RADAR TRANSPONDER
R1141 AND TO COMPUTE THE dx-AXIS TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R11411 COAS TRACKING OF THE LM.
R11412 TO PERFORM THE MANEUVER TO THE SELECTED TRACKING ATTITUDE IF THE
R11413 MANEUVER IS LESS THAN 10 DEGREES BUT TO CALL R80 IF THE MANEUVER IS
R11414 GREATER THAN 10 DEGREES OR IF THE R80FLAG IS SET.
R1142 (1) EXTRAPOLATE LM AND CSM STATE VECTORS TO PRESENT TIME USING
R1143 CONIC EQUATIONS.

R1144 (2) CALCULATE LOS FROM CSM TO LM = $RL - RC$.

R1145 (3) THE PREFERRED TRACKING ATTITUDE IS DEFINED AS FOLLOWS'
R1146 THE TRACK AXIS (I) IS ALIGNED ALONG THE LOS TO THE LM. THE
R1147 TRACK AXIS (I) IS DEFINED AS'
R1148 $UNIT(I) = UNIT(Z) \cos 55 + UNIT(X) \sin 55$
R1149 $\quad \quad \quad -SC \quad \quad \quad -SC$
R1150
R1159 (4) COMPUTE DESIRED CDU ANGLES, USING VECPOINT.
R1189 (7) FORM DIFFERENCE BETWEEN DESIRED AND ACTUAL CDUS.
R1170 IF ANY OF THE THREE ANGLE DIFFERENCES EXCEEDS 10 DEGREES,
R1171 GROSS MANEUVER IS REQUIRED. SIGNAL R81 (SET MPAC=1) TO
R1172 OPERATE KALC MANU AND EXIT CRS61.1.
R1173 IF ALL DIFFERENCES ARE LESS THAN 10 DEGREES, CONTINUE.

R1174 (8) CALCULATE ORTHOGONAL LOS RATE IN REF COORDS AS

R1175 $OMEGATH = (UNITLOS(B_1) \times UNITDV(B_1)) (ABSDV(B_7) / ABSLOS(B_{29}))$
R1176 CONVERSION FACTOR OF $100/2\pi$ (B_4) REV CSEC PER RAD SEC IS
R1177 APPLIED TO YIELD UNITS OF REVS/SEC. SCALE IS CARRIED AS
R1178 $B+1+7-29+4+1$ PLUS RESULTS OF NORMALIZING ABSDV, ABSLOS.
R1179 THE EXTRA $B+1$ RESULTS FROM RESCALING ABSDV B_8 AFTER NORM
R1180 TO AVOID O/FLOW ON DIVIDE.

R1181 $UNITLOS = UNIT(RL - RC) B_1$.
R1182 $UNITDV = UNIT(VL - VC) B_1$.
R1183 $ABSLOS = \text{LENGTH OF LOS, METERS } B_{29}$.
R1184 $ABSDV = \text{LENGTH OF DV, METERS/CSEC } B_7$.

R1185 (9) OBTAIN RATE IN SM COORDS.

R1186 $OMEGATHSM = (REFSMAT)(OMEGATH)$.

R1187 (10) OBTAIN GIMBAL ANGLE INCREMENTS FOR 0.1 SECOND.

R1188 $DIHETASM = (0.1)(OMEGATHSM)$

R1189 (11) OBTAIN DELCDUX, Y, Z USING SUBR SMOURES.



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R1190 INPUT CONSISTS OF

R1191 (A) VECTOR OF ANGULAR INCREMENTS, DTHETASM, STORED
R1192 IN V(DTHETASM).

R1193 (B) SIN, COS CDUX, Y, Z FROM SUBR CDUTRIG.

R1194 TRANSFER OUTPUT OF SMDURES FROM V(DCDU) TO VAC14D.

R1195 (12) CALCULATE ANG LOS RATE IN BODY(NB) COORDS USING SUBR SMNB.

R1196 $\text{OMEGANB} = (\text{SMNB})(\text{OMEGATHSM})$

R1197 SUBR SMNB REQUIRES OMEGATHSM IN V(VAC32D) AND ACTUAL CDUS
R1198 (Y, X, Z ORDER) IN V(VAC20D) WITH S1 OF VAC = BASE ADDRESS
R1199 OF CDUS (FIXLOC + 20D).

R1200 (13) CALCULATE ANG LOS RATE IN CONTROL COORDS AS FOLLOWS

R1201 $\text{WBODY} = (\text{MEDYTCTL})(\text{OMEGANB}) \quad \text{UNITS} = \text{REVS/SIN}(80).$

R1202 $\begin{pmatrix} 0.5 & 0 & 0 \end{pmatrix}$ BODY TO
R1203 $\text{MEDYTCTL}(B_1) = \begin{pmatrix} 0 & \cos(7.25)B_1 & -\sin(7.25)B_1 \end{pmatrix}$ = CONTROL
R1204 $\begin{pmatrix} 0 & \sin(7.25)B_1 & \cos(7.25)B_1 \end{pmatrix}$ AXES
R1205 CONVERSION
R1206 MATRIX

R1207 (14) RESCALE WBODY TO UNITS OF 450 DEG/SEC BY APPLYING FACTOR
R1208 OF 0.8 TO REVS/SEC.

R1209 (15) ADDRESS LIVE AUTOPILOT REGISTERS IN BASIC (UNDER INHINT).

R1210 TRANSFER DESIRED CDUS, SCALED 180 DEGREES, FROM T(SAVEDCDU)
R1211 TO V(CDUXD).

R1212 TRANSFER DELCDUS, SCALED 180 DEG, FROM V(VAC14D)
R1213 TO V(DELCDUX).

R1214 TRANSFER OMEGA CONTROL, SCALED 450 DEG/SEC, FROM V(MPAC)
R1215 TO V(WBODY).

R1216 RELINT, SET MPAC=0, EXIT CRS81.1

R1217 CALL L CALL CRS81.1

R1218 RETURNS ALL TO L+1.

R1219 (1) S(MPAC)=0. NORMAL EXIT. 3 SETS OF INPUTS FED TO DAP.
R1220 (2) S(MPAC)=1. CALCULATED DESIRED CDUS, SP, SET IN T(CPHI)
R1221 FOR KALOMANU. ABS(ACDU - DCDU) EXCEEDS 10 DEGREES.
R1222 (3) S(MPAC)=2. GNC'S AUTO MODE NOT SELECTED (BIT10=1).
R1223 (4) S(MPAC)=3. DAP HOLD FLAG (HOLDFLAG) NOT EQUAL -1.



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R1224 INPUT (1) TIME2,TIME1. COMPUTER CLOCK TIME,DP, CENTISEC B28.
R1225 (2) CDUX,Y,Z. PRESENT CDU ANGLES,SP,2S COMPL HALF-REVS B0.
R1228 (3) M(REFSQAT),STABLE MEMBER COORDS B1.

R1227 OUTPUT NORMAL. EXIT WITH S(MPAC) = 0.

R1228 (1) CDUD,CDUD,CDUD, DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1229 DP, 1S COMPL, SCALED 180 DEGREES (HALF-REVS B0).
R1230 (2) DELCDUX,DELCDUY,DELCDUZ. 0.1 SEC DCU ANGULAR INCREMENTS,
R1231 DP, 1S COMPL, SCALED 180 DEG.
R1232 (3) WBODY,WBODY1,WBODY2. LOS ANGULAR RATE IN CONTROL COORDS,
R1233 DP, 1S COMPL, SCALED 450 DEG/SEC.

R1234 SPECIAL. EXIT WITH S(MPAC) = 1.

R1235 (1) CPHI,CTHETA,CPSI. DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1236 SP, 2S COMPL, SCALED 180 DEGREES.

R1237 EXTERNAL SUBROUTINES USED (B)=BASIC

R1238 (1) CALCOA (5) LOADTIME(B) (9) S(MB)
R1239 (2) CDUTRIG (6) MATMOVE
R1240 (3) CSMCONIC (7) RCDUS(B)
R1241 (4) LEMCONIC (8) S(MDURES)

R1242 ERASABLE (1) S(Q611),EBANK7 CRS61.1 EXIT.
R1243 (2) S(Q611),EBANK7 CALCDU EXIT.
R1244 (3) T(SAVECDU) E6 SP VECTOR OF CDUDS.
R1245 (4) V(SAVEPOS) E7 CSM POS VEC AND D(SAVEPOS)= LENGTH OF LOS.
R1246 (5) V(SAVEVEL) E7 CSM VEL VEC.

R1247 FLAGS HOLDFLAG. USED, NOT SET.

R1248 MISC (1) ERASABLE ITEMP1 USED TO TEMP STORE EBANK UNDER INHINT.
R1249 (2) ERASABLE P21TIME3 USED AS TEMP STORE DURING CRS61.1
R1250 (3) ERAS DTHETAS4 USED AS TEMP STORE DURING EARLY CRS61.1

R1251 DEBRIS - CURRENT VAC AREA, CRS61.1 ERASABLES, ITEMP1, P21TIME

1252				24,2002		BANK	24
1253	REP	1		34,2000		SETLOC	P20S4
1254				34,3225		BANK	
1255	REP	6	LAST	412	E6,1646	EBANK=	CDUD
1258	REP	1				COUNT*	33/CRS61
A1257							
1258				34,3225	40220 0	CRS61.1	STO
1259	REP	2	LAST	123	34,3226	03704 1	Q611
1260				34,3227	00001 0		0
1261				34,3230	77634 0		RTR



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1262	REF	16	LAST	570	34,3231	45505 0		LOADTIME	LOAD CLOCK TIME2,1 INTO MPAC.
A1263									
1264	REF	8	LAST	451	34,3232	38316 0	STORT	STCALL P21TIME	STORE CLOCK TIME FOR SUBR R63
1265	REF	1			34,3233	71461 1		R63	SUBR TO CALC DCDU(T=PRESENT,PASS1)
1266					34,3234	77751 1		TLOAD	
1267	REF	13	LAST	421	34,3235	01156 1		THETAD	SAVE DCDU(T) FROM CALCDU FOR STEP4.
1268	REF	2	LAST	113	34,3236	03373 0		STORE	SAVEDCDU
A1269									
1270					34,3237	77776 1		EXIT	
12701	REF	1			34,3240	0 3265 0		TC	STEP2CK +4
1271	REF	8	LAST	383	34,3241	3 4371 0	AUTOCK	CAP	PRI030
1272					34,3242	0 0006 1		EXTEND	
1273	REF	3	LAST	539	34,3243	06 031 0		RXOR	CHAN31
1274	REF	2	LAST	554	34,3244	7 7707 1		MASK	PURST3
1275					34,3245	0 0006 1		EXTEND	
1276	REF	1			34,3246	1 3250 1		BZF	DAPOK
1276	REF	1			34,3247	0 3254 1		TC	ASET
1279	REF	13	LAST	562	34,3250	4 0075 1	DAPOK	CS	FLAGWRD1
1280	REF	37	LAST	559	34,3251	7 4675 0		MASK	BIT14
1281	REF	146	LAST	565	34,3252	10 000 0		CCS	A
1282	REF	1			34,3253	0 3320 0		TC	STEP3CK
1283	REF	122	LAST	577	34,3254	3 4714 1	ASET	CAP	ZERO
1284	REF	253	LAST	577	34,3255	54 154 0		TS	MPAC
1285	REF	95	LAST	577	34,3256	0 6006 1		TC	INTPRET
1286					34,3257	77850 1		GOTO	
1287	REF	3	LAST	582	34,3260	03704 1			Q611
1288	REF	9	LAST	439	34,3261	4 0101 0	STEP2CK	CS	FLAGWRD5
1289	REF	25	LAST	506	34,3262	7 4707 1		MASK	BIT4
1290					34,3263	0 0006 1		EXTEND	
1291	REF	1			34,3264	1 3452 0		BZF	MANUEXIS
12911	REF	140	LAST	577	34,3265	0 4555 0		TC	BANKCALL
12912	REF	2	LAST	195	34,3266	57750 1		CADR	UPACTOFF
1292	REF	32	LAST	578	34,3267	3 4711 1		CAP	TWO
1293	REF	2	LAST	107	34,3270	55=611 1	CDU LOOP	TS	DIHETASM
1294	REF	3	LAST	583	34,3271	51=611 0		INDEX	DIHETASM
1295	REF	12	LAST	563	34,3272	3 0032 0		CA	CDUX
1296					34,3273	0 0006 1		EXTEND	
1297	REF	4	LAST	583	34,3274	5 1611 0		INDEX	DIHETASM
1296	REF	14	LAST	583	34,3275	21=155 0		MSU	THETAD
1299	REF	254	LAST	583	34,3276	54 154 0		TS	MPAC
1300	REF	96	LAST	583	34,3277	0 6006 1		TC	INTPRET
1301					34,3300	45246 0		ABS	DSJ
1302	REF	1			34,3301	31550 0			DEGREE10
1303					34,3302	77444 0		BPL	EXIT
1304	REF	1			34,3303	71307 0			STKTEST
1305	REF	5	LAST	583	34,3304	11=611 1		CCS	DIHETASM
1306	REF	1			34,3305	0 3270 1		TC	CDU LOOP

IS STIKFLAG SET (I.E. IS SOMEONE ON RHC)

EXIT CRS61.1

IS R60FLAG SET

YES, DO R60

SET TEMPORARY INDEX DIHETASM = 2

SET A = ACTUAL CDU (ACDU).

SET INDEX TO ACCESS DESIRED CDU (DCDU).
A = DIFF = ACDU - DCDU.
RETURN TO INTERPRETER FOR 10 DEGREE CK.
(DP APPROX SP CK FOR ROUGH CHECK)

IS (ACDU - DCDU) MORE THAN 10 DEGREES.
NO - OK, CONTINUE CHECKING OTHER ANGLES.
TEST STICK FLAG
HAVE ALL 3 ANGLE DIFFS BEEN CHECKED.
NO - DIM COUNT, CHECK NEXT ANGLE DIFF.

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13061	REP	1		34,3306	0 3241 0	TC	AUTOCK
13062				34,3307	77776 1	EXIT	STKTEST
130625	REP	14	LAST	583	34,3310	4 0075 1	CS
13063	REP	38	LAST	583	34,3311	7 4675 0	MASK
130635	REP	147	LAST	583	34,3312	10 000 0	CCS
13064	REP	2	LAST	583	34,3313	0 3452 1	TC
130645	REP	19	LAST	539	34,3314	3 4710 0	CAP
13065				34,3315	0 0006 1	EXTEND	BIT3
130655	REP	21	LAST	381	34,3316	05 011 1	WOR
130665	REP	2	LAST	583	34,3317	0 3254 1	TC
1307	REP	97	LAST	583	34,3320	0 6006 1	TC
1308				34,3321	77601 0	INTPRET	STEP3CK
1309				34,3322	00001 0	SETPD	
A1310						0	
A1311							
1312				34,3323	52375 1	CRS61.2	VLOAD
1313	REP	3	LAST	110	34,3324	03204 1	VSU
1314	REP	2	LAST	124	34,3325	03715 1	DCDU
1315				34,3326	57456 1	SAVEVEL	
1316				34,3327	74235 0	UNIT	VCOMP
1317	REP	2	LAST	123	34,3330	03707 1	VXV
1318	REP	1			34,3331	31551 1	VXSC
1319				34,3332	77606 1	PUSH	SAVEPOS
1320				34,3333	60345 0	RVC/S/RDS	
1321	REP	9	LAST	563	34,3334	02316 1	DLOAD
1322	REP	21	LAST	571	34,3335	00047 1	NORM
1323				34,3336	77606 1	P21TIME	X1
A1324						PUSH	
1325				34,3337	60345 0	DLOAD	NORM
1326				34,3340	00045 0	36D	
1327	REP	8	LAST	576	34,3341	00051 0	S1
A1328							
1329				34,3342	70460 1	XSU,1	SR1
1330	REP	9	LAST	564	34,3343	00050 1	S1
1331				34,3344	74271 0	DDV	VXSC
1332				34,3345	77730 0	SKA,1	
1333	REP	2	LAST	123	34,3346	03705 0	Q6111
A1334							
A1335							
A1336							
A1337							
1338				34,3347	76521 0	MXV	VSL1
1339	REP	15	LAST	566	34,3350	01736 1	REFSMAT
1340				34,3351	00025 0	STORE	20D
A1341							
1342				34,3352	77761 1	VXSC	
1343	REP	1			34,3353	31553 0	TENTH
1344	REP	6	LAST	563	34,3354	03212 0	STORE
1345				34,3355	77624 1	DTHEMS4	CALL

STIKFLAG IS NOT SET (DO R63)

STIKFLAG IS SET
TURN ON UPACTY LIGHT

EXIT AND SET R61CNTR

*
NOW HAVE DCDUS STORED IN T(SAVEDCDU).
GO CALC OTHER DAP INPUTS (DELODU,WBODY)

DV = VL - VC
V(MPAC)=-UNITDV,VAC36D=ABSDV.
(-UNITDV)CROSS(UNITLOS).
(UNITLOS B1)(UNITDV B1)(CONST B4)=CROSS.
HOLD CROSS IN PUSH1STO. SCALED B8.
OBTAIN ABS VALUE OF LOS.
P21TIME IS TEMP STORE FOR ABSLOS.
NORM ABSLOS(DENOM) AND HOLD IN PUSH1.

NORM ABS VALUE OF DV(NUM).

X1 = X1(N DENOM)-S1(N NUM).
SR1 TO AVOID OFLOW ON DDV.
ABSDV(MPAC)/ABSLOS(PUSH1) = QUOT.
QUOT(MPAC) X CROSS(PUSH0)
SAVE SCALE OF RESULT (B-15,1X).
X1= NORM OF QUOT. QUOT SCALE B7-B29=B-22
CROSS IS SCALED B6. NEED SL1 TO RECOVER
SR1 SO THAT -22+6+1=-15. MPAC NOW HOLDS
ORTHO LOS RATE (OMEGA TH, B-15,X1).
OBTAIN RATE IN S4 COORDS (OMEGTHS4) AND
ADJUST FOR REFSMAT SCALE OF B1.
OMEGTHS4 = VAC20D
DELTA THETA S4 = OMEGTHS4 * .1B-3.

STORE S4 INCREM ANGLES FOR S4CDURS.



L P20-P25

USER=3 PAGE NO. 34 E6 S3

1346 REF 3 LAST 535 34,3358 47432 1
1347 34,3357 45001 1
1348 34,3360 00001 0
1349 REF 1 34,3361 47675 0
1350 34,3362 77750 0
1351 REF 3 LAST 564 34,3363 03705 0
1352 34,3364 53775 1
1353 REF 4 LAST 564 34,3365 03204 1
1354 34,3366 20160 1
1355 34,3367 00017 1
A1356
1357 34,3370 77624 1
1358 REF 4 LAST 585 34,3371 47432 1
1359 34,3372 45175 0
1360 34,3373 00025 0
1361 REF 2 LAST 281 34,3374 47577 1
1362 34,3375 77721 0
1363 REF 2 LAST 537 34,3376 31557 1
1364 34,3377 77761 1
1365 REF 1 34,3400 15270 0
1366 34,3401 53750 0
1367 REF 4 LAST 585 34,3402 03705 0
1368 34,3403 20163 1
A1369
1370 34,3404 77776 1
1371 34,3405 0 0004 0
1372 REF 123 LAST 563 34,3406 3 4714 1
1373 REF 7 LAST 582 34,3407 55*647 1
1374 REF 4 LAST 412 34,3410 55*651 0
1375 REF 4 LAST 412 34,3411 55*653 1
1376 REF 3 LAST 583 34,3412 3 1772 1
1377 REF 6 LAST 585 34,3413 55*648 0
1378 REF 4 LAST 585 34,3414 3 1773 0
1379 REF 5 LAST 585 34,3415 55*650 1
1380 REF 5 LAST 585 34,3416 3 1774 1
1381 REF 5 LAST 585 34,3417 55*652 0
A1382
1383 34,3420 0 0006 1
1384 REF 255 LAST 563 34,3421 3 0155 0
1385 REF 9 LAST 411 34,3422 53*526 0
1386 34,3423 0 0006 1
1387 REF 256 LAST 585 34,3424 3 0160 0
1388 REF 4 LAST 411 34,3425 53*530 1
1389 34,3426 0 0006 1
1390 REF 257 LAST 585 34,3427 3 0162 1
1391 REF 5 LAST 411 34,3430 53*532 0
A1392
1393 34,3431 0 0006 1
1394 REF 9 LAST 537 34,3432 5 0120 1
1395 34,3433 3 0017 1

SETPD CDUTRIG
CALL
0
SMCDURES
LXA,1
VLOAD Q6111
VSL*
DCDU
0 -17D,1
STORE 14D
CALL
CDUTRIG
VLOAD CALL
20D
SMNB
MXV MBODYCTL
VXSC
LXA,1 POINTB
VSL*
Q6111
0 -14D,1
CRS61.2A EXIT
INHINT
CAP ZERO
TS CDUXD +1
TS CDUYD +1
TS CDUZD +1
CA SAVEDCDU
TS CDUXD
CA SAVEDCDU +1
TS CDUYD
CA SAVEDCDU +2
TS CDUZD
EXTEND
DCA MPAC
DXCH WBODY
EXTEND
DCA MPAC +3
DXCH WBODY1
EXTEND
DCA MPAC +5
DXCH WBODY2
EXTEND
INDEX
DCA FIXLOC
14D

OBTAIN SIN,COSCDUS FOR SMCDURES.
SMCDURES USES PUSH
OBTAIN DELCDU IN V(DCDU).
RELOAD X1
RECOVER SCALE.
(B-15,X1) + TENTH(B-3) + HALPREVS(B1)
EQUALS B-17D,1 TO OBTAIN HALPREVS BO.
HOLD DELS IN V(VAC14D) FOR AUTOPILOT.
COMPUTES SINES AND COSINES FOR *SMNB*
LOAD VECTOR AND CALL TRANSFORMATION
VECTOR FOR TRG*SMNB INTO MPAC
OBTAIN ANG. RATE REFERRED TO NB (BODY)
CONVERT RATE(OMEGA) TO CONTROL COORDS.
MULT. BY 0.6 TO RESCALE REVS TO 450 DEG.
RECOVER SCALE.
RELOAD X1 TO RECOVER NORMALIZ.
(B-15,X1) + MBODYCTL(B1) = B-14D,1 TO
OBTAIN REVS SCALED AT 450 DEGREES.

TRANSFER DESIRED GIMBAL ANGLES
FROM T(SAVEDCDU) TO V(CDUXD).

TRANSFER OMEGA CONTROL (ANG.LOS RATE)
FROM V(MPAC) TO V(WBODY).

TRANSFER CDU INCREMENTS
FROM V(VAC14D) TO V(DELCTUX).



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1396	REF	5	LAST	411	34,3434	53=576 0			
1397					34,3435	0 0008 1		DXCH	DELCUX
1398	REF	10	LAST	585	34,3436	5 0120 1		EXTEND	
1399					34,3437	3 0021 1		INDEX	PIXLOC
1400	REF	4	LAST	411	34,3440	53=800 1		DCA	18D
1401					34,3441	0 0008 1		DXCH	DELCUX
1402	REF	11	LAST	586	34,3442	5 0120 1		EXTEND	
1403					34,3443	3 0023 0		INDEX	PIXLOC
1404	REF	4	LAST	411	34,3444	53=802 0		DCA	18D
1405	REF	70	LAST	575	34,3445	4 4712 0		DXCH	DELCUX
1406	REF	5	LAST	554	34,3446	55=332 0		CS	ONE
1407					34,3447	0 0003 1		TS	HOLDFLAG
1408	REF	124	LAST	585	34,3450	3 4714 1		RELINT	
1409	REF	3	LAST	584	34,3451	0 3254 1		CAP	ZERO
1410	REF	98	LAST	584	34,3452	0 8008 1	MANUEXIS	TC	ASET
1411					34,3453	77751 1	MANUEXIT	TC	INTPRET
1412	REF	8	LAST	585	34,3454	03373 0		TLOAD	
1413	REF	8	LAST	412	34,3455	01158 1		STORE	SAVEDCU
1414					34,3456	52135 1		SLOAD	CPHI
1415	REF	1			34,3457	31801 1			GOTO
1416	REF	4	LAST	583	34,3460	03704 1			LOONE
1417									Q811
1418					34,3461	71220 1	R83	STO	DLOAD
1419	REF	5	LAST	585	34,3462	03705 0			Q8111
1420	REF	10	LAST	584	34,3463	02316 1			P21TIME
1421	REF	26	LAST	576	34,3464	34041 0		STCALL	TDEC1
1422	REF	4	LAST	555	34,3465	27045 0			CSMCONIC
1423					34,3466	77775 1	HOLDATT	VLOAD	
1424	REF	16	LAST	555	34,3467	00001 0			RATT
1425	REF	3	LAST	584	34,3470	27707 1		STOVL	SAVEPOS
1426	REF	14	LAST	555	34,3471	00007 0			VATT
1427	REF	3	LAST	584	34,3472	03715 1		STORE	SAVEVEL
1428					34,3473	77745 1	CALCLEM	DLOAD	
1429	REF	11	LAST	586	34,3474	02316 1			P21TIME
1430	REF	29	LAST	586	34,3475	34041 0		STCALL	TDEC1
1431	REF	3	LAST	545	34,3476	27057 0			LEMCONIC
1432					34,3477	77775 1		VLOAD	
1433	REF	15	LAST	586	34,3500	00007 0			VATT
1434	REF	5	LAST	585	34,3501	27204 1		STOVL	DCDU
1435	REF	19	LAST	586	34,3502	00001 0			RATT
1436					34,3503	53451 1	VSU	UNIT	
1437	REF	4	LAST	586	34,3504	03707 1			SAVEPOS
1438	REF	5	LAST	586	34,3505	03707 1		STORE	SAVEPOS
1439					34,3506	76521 0		MXV	VSL1
1440	REF	16	LAST	584	34,3507	01738 1			REFSMAT
1441	REF	3	LAST	387	34,3510	17357 0		STOVL	POINTVSM
1442					34,3511	00045 0			36D
1443	REF	12	LAST	586	34,3512	02316 1		STORE	P21TIME
1444					34,3513	77775 1		VLOAD	
1445	REF	4	LAST	32	34,3514	15330 0			UNITX

NOW DAP VARIABLES LOADED. SET HOLDFLAG.
TO -1.

NORMAL RETURN (MPAC = 0)

ENTER FROM STEP2. ACQU-DCDU EXCEEDS
10 DEG. STORE DCDU(T) IN CPHI, CTHETA,
CPSI FOR KALCMANU.
SPECIAL RETURN (MPAC+0 = 1
OCTAL 00001

SUBR TO CALC DCDU(T)

HOLD EXTRAPOLATED CSM POSITION AND
VELOCITY

EXTRAPOLATE LEM STATE VECTOR TO SAME
TIME AS CSM USING LEMCONIC.

STORE VATT IN DCDU TEMPORARILY
LOS = RL, RC

SAVE UNITLOS FOR CRS61.2 RATE CALC.

CONVERT TO STABLE MEMBER.

HOLD ARS VAL OF LOS (VAC 36D)
IN D(P21TIME) FOR CRS61.2 RATE CALC.



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1446	REP	11	LAST	389	34,3515	37351 1	STCALL	SCAXIS	TRACK AXIS UNIT VECTOR
1447	REP	3	LAST	363	34,3516	56126 1		VECPPOINT	FOR +X-AXIS TRACKING ATTITUDE
1448	REP	7	LAST	277	34,3517	01334 1	STORE	CPHIX	STORE ANGLES FOR N96 DISPLAY
1449					34,3520	77775 1	VLOAD		
1450	REP	1			34,3521	31542 0		PRFUNIT	
1451	REP	12	LAST	567	34,3522	37351 1	STCALL	SCAXIS	
1452	REP	4	LAST	567	34,3523	56126 1		VECPPOINT	
1453	REP	5	LAST	277	34,3524	03723 1	STORE	PRAXIS	STORE ANGLES FOR N95 DISPLAY
1454					34,3525	77614 1	BOFF		
1455	REP	4	LAST	552	34,3526	02745 0		PRPTRKAT	
1456	REP	1			34,3527	71533 1		CRSTOR1	
1457	REP	15	LAST	563	34,3530	01156 1	CRSTOR	STORE	STORE ANGLES FOR N16 DISPLAY
1458					34,3531	77650 1		GOTO	
1459	REP	6	LAST	586	34,3532	03705 0			
1460					34,3533	77775 1	CRSTOR1	VLOAD	
1461	REP	5	LAST	586	34,3534	15330 0		UNITX	
1462	REP	13	LAST	567	34,3535	03351 0	STORE	SCAXIS	
1463					34,3536	52151 0	TLOAD	GOTO	
1464	REP	8	LAST	587	34,3537	01334 1		CPHIX	
1465	REP	1			34,3540	71530 1		CRSTOR	
1466					34,3541	15066 0	PRFUNIT	ZDEC	55 DEG TRACK AXIS UNIT VECTOR
1466					34,3542	17628 0			
1467					34,3543	00000 1	ZDEC	0.0	FOR USE WITH VECPPOINT
1467					34,3544	00000 1			
1468					34,3545	11132 1	ZDEC	.28678822	
1468					34,3546	27477 0			
1469					34,3547	01616 1	DEGREE10 DEC	.05556	10 DEG IN REVS STEP2
1470					34,3550	37651 1	RVC5/RDS	ZDEC	15.915494 B-4 100/2PI REV-CSEC/RAD-SEC.
1470					34,3551	16721 1			
1471					34,3552	31463 1	TENTH	ZDEC	.1 B+3 .1 B-3 (TO SCALE ANG.RATE TO .1 INREMS)
1471					34,3553	06315 0			
1474					34,3554	20000 0	MAT1B1	ZDEC	1.0 B-1
1474					34,3555	00000 1			
1475					34,3556	20000 0	MEDYCTL	ZDEC	.5 7.25 DEG NEGATIVE
1475					34,3557	00000 1			
1476					34,3560	00000 1	ZDEC	0	X-AXIS ROTATION MATRIX
1476					34,3561	00000 1			
1477					34,3562	00000 1	ZDEC	0	CONVERTS BODY TO CTL
1477					34,3563	00000 1			
1478					34,3564	00000 1	ZDEC	0	AXES. SAME AS QUADROT
1478					34,3565	00000 1			
1479					34,3566	17676 0	ZDEC	.99200495 B-1	COS7.25 B1 BUT SCALED B1
1479					34,3567	20113 0			
1480					34,3570	75766 1	ZDEC	-.12619897 B-1	-SIN7.25 B1
1480					34,3571	45544 0			
1481					34,3572	00000 1	ZDEC	0	
1481					34,3573	00000 1			
1482					34,3574	02011 0	ZDEC	-.12619897 B-1	SIN7.25 B1
1482					34,3575	32233 1			
1483					34,3576	17676 0	ZDEC	.99200495 B-1	COS7.25 B1
1483					34,3577	20113 0			



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1484 34,3800 00001 0 LOONE OCT 00001
1485 REP 3 LAST 384 7707 FURST3 EQUALS 13,14,15

TO SET MPAC = 00001 FOR SPECIAL EXIT.
CONSTANT FOR AUTOCK (OCT 70000).



L P20-P25

USER'S PAGE NO. 38 E6 S3

R1486 S22.1 ORBITAL NAVIGATION ROUTINE
R1487 MOD 1

R1488 FUNCTIONAL DESCRIPTION
R1489 1. UPDATE CSM STATE VECTOR
R1490 2. UPDATE LANDMARK POSITION
R1491 3. CONVERT W MATRIX FROM 9 TO 6 DIMENSIONS

R1492 SUBROUTINES CALLED
R1493 INTSTALL, INTEGRV, GETUM, SETRE, R-TO-TP, RP-TO-R, RVECTORS, INCORP1, INCORP2
R1494 LALOTORV, S22P2410, LAT-LONG, ROWDOT

R1495 ERASABLE INITIALIZATION
R1496 W=9X9 MATRIX
R1497 ORBWFLAG=0 FOR INVALID W MATRIX, =1 FOR VALID W MATRIX
R1498 ASTRONAUT ENTRY OF KNOWN, L, OFF
R1499 BNN= NUMBER OF MARKS DECIMAL INTEGER 0-14
R1500 REFSMAT= TRANSFORMATION MATRIX
R1501 MARKSTAT= ADDRESS OF START OF MARK DATA (MARK DATA OF EACH MARK IS
R1502 STORED AS FOLLOWS, TIME, ATG, SA, AMG, PA, AOB) TIME IS IN DOUBLE
R1503 PRECISION, ALL OTHERS ARE IN SINGLE PRECISION
R1504 CSM STATE VECTOR

R1505 OUTPUT
R1506 UPDATED CSM STATE VECTOR
R1507 UPDATED LANDMARK POSITION
R1508 NEW 6 DIMENSIONAL W MATRIX

R1509 DEBRIS
R1510 PUSH LIST, CSMPOS, ALPHAV, ERADM, UM, RCLP, USTAR, VARIANCE, X789, RVECTOR, 8KK,
R1511 S22LOC, SVMRKDAT TABLE, 22SUBSCL, LANDMARK, CXOFF, S22C, LAT, LONG, ALT,
R1512 TEMPOR1, S22TOFF, S221OFF, DSPTM1, S22EOM, S22TPRM

1513				13,2176		BANK	13	
1514	REF	.1		30,2000		SETLOC	P20S6	
1515				30,2255		BANK		
1516	REF	18	LAST	559	E5,1751	EBANK=	LANDMARK	
1517	REF	1				COUNT	35/LUORB	
1518				30,2255	66220 1	S22.1	STO	SSP
1519	REF	2	LAST	123	30,2258	03703 0		S22RINEX
1520	REF	10	LAST	584	30,2257	00051 0		S1
1521				30,2260	00006 1		DEC	6
1522				30,2261	66331 0		SSP	SSP
1523	REF	2	LAST	95	30,2262	02747 1		8KK
1524				30,2263	00001 0		DEC	1
1525	REF	2	LAST	95	30,2264	02751 0		S22LOC
1526	REF	5	LAST	175	30,2265	03537 0	ECADR	SVMRKDAT

SET I=1 ITEM 8KK IS I

SET MARK DATA ADDRESS INTO S22LOC

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L	P20-P25					USER'S PAGE NO.	39	E5 83
1527				30,2266	76144 1	LXC,2	AXT,1	
1528	REF	31	LAST	561	30,2267		MARKSTAT	
1529				30,2270	00044 1	DEC	36	
1530				30,2271	77773 1	S22.111	VLOAD*	
1531				30,2272	77776 1		0,2	MOVE MARK DATA (5 SETS) FROM ADDR. IN
1532	REF	6	LAST	569	30,2273		STORE SVMRKDAT +36D,1	MARKSTAT TO SVMRKDAT TABLE TO AVOID LOSS
1533				30,2274	60114 0	INCR,2	TIX,1	IF RESTART OCCURS
1534				30,2275	77771 0	DEC	-6	
1535	REF	1			30,2276		S22.111	
1536				30,2277	77414 0	SET	EXIT	
15361	REF	2	LAST	555	30,2300		P22AKPLG	DOWNLINKED SVMRKDAT HOLDS PRESENT MARKS
1537	REF	141	LAST	563	30,2301		BANKCALL	RELEASE VAC AREA WHERE MARK DATA WAS
1538	REF	5	LAST	444	30,2302		MCRELEAS	
1539	REF	9	LAST	556	30,2303		TC 2PHSCHNG	
1540				30,2304	00004 0	OCT	00004	
1541				30,2305	05022 1	OCT	05022	
15411				30,2306	13000 0	OCT	13000	
1542	REF	99	LAST	566	30,2307		TC INTPRET	
1543				30,2310	43170 0	AXT,1	BOFF	
1544				30,2311	00000 1		OD	
1545	REF	8	LAST	576	30,2312		QMOONFLG	=0 EARTH,=1 MOON
1546	REF	1			30,2313		S22SHIFT	
1547				30,2314	60316 0	INCR,1		
1548				30,2315	77775 1	DEC	-2	
1549				30,2316	40330 0	S22SHIFT SKA,1	SETPD	
1550	REF	2	LAST	123	30,2317		S22EORM	SET =0 EARTH,=-2 MOON FOR SHIFTING
1551				30,2320	00001 0		OD	
1554				30,2321	77624 1	FIG2EXIT CALL		
1555	REF	15	LAST	576	30,2322		INTSTALL	
1556				30,2323	77624 1	CALL		
1557	REF	1			30,2324		S22FLGS	
R1556				FLOWCHART D=0	THEN DIM0FLAG=0	D6OR9FLG NOT TESTED		
R1559				FLOWCHART D=6	THEN DIM0FLAG=1	D6OR9FLG=0		
R1560				FLOWCHART D=9	THEN DIM0FLAG=1	D6OR9FLG=1		
1561				30,2325	43014 0	BOFF	CLAGO	
1562	REF	4	LAST	570	30,2326		ORBWFLAG	
1563	REF	1			30,2327		SETWWS5D	BRANCH TO SET W0-W5, ORBWFLAG,D
1564	REF	2	LAST	576	30,2330		D6OR9FLG	FLOWCHART D=6 PATH
1565	REF	1			30,2331		SETVANDI	
1566				30,2332	77614 1	SETWWS5D CLEAR		
1567	REF	6	LAST	576	30,2333		DIM0FLAG	FLOWCHART D=0 PATH
1568				30,2334	66370 0	AXT,1	SSP	
1569				30,2335	00154 1	DEC	106	
1570	REF	11	LAST	569	30,2336		S1	
1571				30,2337	00006 1	DEC	6	
1572				30,2340	77214 0	CLEAR	VLOAD	
1573	REF	7	LAST	571	30,2341		RENDWFLG	GSOP CHANGE 6/16/67
1574	REF	12	LAST	576	30,2342		ZEROVECS	
1575	REF	13	LAST	579	30,2343		CLEARW5 STORE	



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1576				30,2344	67300 0	TIX,1	SLOAD		
1577	REF	1		30,2345	60343 0		CLEARWWS		
1578	REF	1		30,2346	02005 0		WORBPOS		
1580	REF	14	LAST	590	30,2347	02401 0	STORE	W	SET DIAGONALS OF W0
1581	REF	15	LAST	591	30,2350	02411 1	STORE	W +8D	
1582	REF	16	LAST	591	30,2351	02421 1	STORE	W +16D	
1583				30,2352	77735 0		SLOAD		
1584	REF	1		30,2353	02008 0		WORBVEL		
1585	REF	17	LAST	591	30,2354	02511 0	STORE	W +72D	SET DIAGONALS OF W4
1586	REF	18	LAST	591	30,2355	02521 0	STORE	W +80D	
1587	REF	19	LAST	591	30,2356	02531 1	STORE	W +88D	
1588				30,2357	77614 1	SETVANDI	CLEAR		
1589	REF	2	LAST	572	30,2360	02666 0		DMENFLG	0=6X6W, 1=9X9W
1590				30,2361	77624 1	S22NXTIN	CALL		
1591	REF	1		30,2362	61322 0		GETTF		
1592	REF	30	LAST	586	30,2363	34041 0	STCALL	TDEC1	
1593	REF	8	LAST	573	30,2364	27113 1		INTEGRV	
1594				30,2365	77624 1		CALL		
1595	REF	1		30,2366	61273 0		S22CALRC		CALC. RC B-29 OR B-27 (CSMPOS)
1596				30,2367	66150 0	LXA,1	SXA,1		
1597	REF	3	LAST	589	30,2370	02750 1	S22LOC		SETUP ADDR. OF MARK DATA FOR GETUM SUBR.
1598	REF	4	LAST	589	30,2371	01242 1	MARKDATA		
1599				30,2372	77624 1		CALL		COMPUTE UM
1600	REF	2	LAST	571	30,2373	47110 1	S2GETUM	GETUM	
1601	REF	5	LAST	571	30,2374	01235 1	STORE	UM	
1604				30,2375	41535 1	DMPINTEG	SLOAD	PUSH	TEST OFF=I
1605	REF	3	LAST	589	30,2376	02747 1		8KK	
1606				30,2377	50535 1		SLOAD	SR3	CXOFF SCALED B-5, MUST MOVE TO B-14
1607	REF	3	LAST	558	30,2400	02748 0		CXOFF	BEFORE SUBT.
1608				30,2401	50442 0		SR3	SR3	
1609				30,2402	77625 0		DSU		
1610				30,2403	43030 0		RHIZ	BCN	
1611	REF	1		30,2404	60720 1		S22OFF=I		BRANCH HERE IF OFF=I
1612	REF	3	LAST	591	30,2405	02706 1	DMENFLG		0=6X6W, 1=9X9W
1613	REF	1		30,2406	60728 1		S22D=9		
16131				30,2407	77624 1		CALL		
16132	REF	12	LAST	574	30,2410	56741 0		GRP2PC	
1614				30,2411	77614 1		SET		
1615	REF	5	LAST	590	30,2412	01471 1		ORWFLAG	
1616				30,2413	43014 0		SET	SET	
1617	REF	4	LAST	591	30,2414	02466 1		DMENFLG	=0 ON FIRST PASS THRU HERE FOR D=0, OR6
1618	REF	1		30,2415	01062 1			22DSPFLG	=1 TO DISPLAY DR,DV ON FIRST PASS
1619				30,2416	43014 0		SET	BCN	
1620	REF	4	LAST	555	30,2417	00462 1		ERADFLAG	=1 TO COMPUTE FISCHER RADIUS
1621	REF	6	LAST	559	30,2420	03307 0		KNOWFLG	
1622	REF	1		30,2421	61070 1		S22BOX22		
1623				30,2422	53575 0	VLOAD	UNIT		UNIT ALSO PUTS ARVAL(RC) IN 36D
1624	REF	5	LAST	574	30,2423	01207 0		CSMPOS	
1625	REF	4	LAST	558	30,2424	02152 0	STORE	ALPHAV	ALPHAV +4=SINL FOR SETRE
1626				30,2425	43014 0		CLEAR	BOFF	

L P20-P25

1627	REP	5	LAST	558	30,2426	01663 0
1628	REP	9	LAST	590	30,2427	04343 1
1629	REP	1			30,2430	60433 0
1630					30,2431	77614 1
1631	REP	6	LAST	592	30,2432	01463 1
1632					30,2433	77824 1
1633	REP	1			30,2434	28533 0
1634					30,2435	77824 1
1635	REP	1			30,2438	61240 0
1636					30,2437	70414 1
1637	REP	10	LAST	592	30,2440	04343 1
1638					30,2441	60442 0
1639	REP	1			30,2442	02835 0
1640					30,2443	72441 0
1641	REP	6	LAST	591	30,2444	01235 1
1642	REP	1			30,2445	24037 0
1643	REP	13	LAST	590	30,2446	15332 1
1644					30,2447	41401 1
1645					30,2450	00001 0
1646					30,2451	65208 0
1647	REP	5	LAST	558	30,2452	15330 0
16471					30,2453	77702 1
1648					30,2454	00005 1
1649					30,2455	00011 1
1650					30,2456	24015 0
1651	REP	7	LAST	592	30,2457	01235 1
1652	REP	1			30,2460	24023 0
1653	REP	2	LAST	592	30,2461	02635 0
1654					30,2462	77624 1
1655	REP	1			30,2463	61303 0
1656					30,2464	66370 0
1657					30,2465	00022 1
1658	REP	12	LAST	590	30,2466	00051 0
1659					30,2467	00006 1
1660					30,2470	70573 1
1661	REP	1			30,2471	03524 1
16611					30,2472	77741 0
1662	REP	2	LAST	592	30,2473	00037 0
1663					30,2474	45445 0
1664	REP	2	LAST	592	30,2475	70253 1
1665					30,2476	76100 1
1666	REP	1			30,2477	60470 1
1667					30,2500	00044 1
1668					30,2501	64373 1
1669	REP	20	LAST	591	30,2502	02445 0
1670	REP	3	LAST	592	30,2503	03502 0
1671					30,2504	77732 1
1672	REP	21	LAST	592	30,2505	06621 1
1673					30,2506	71300 1
1674	REP	1			30,2507	60501 0

	LUNAFLAG
	CMOONFLG
	S22C=I
SET	
	LUNAFLAG
S22C=I	CALL
	SETRE
CALL	
	S22P2410
BOFF	VSR2
	CMOONPLG
	+1
STORE	S22RL
DOT	SL1
	UM
STOVL	S22D
	ZEROVECS
SETPD	PUSH
	OD
PUSH	PDDL
	HIDPHALF
SR2	
STORE	4D
STORE	8D
STOVL	12D
	UM
STOVL	S223X1
	S22RL
CALL	
	S2231X13
AXT,1	SSP
DEC	18
	S1
DEC	6
S22NXTU	VLOAD* VSR2
	S22UMRL +18D,1
V/SC	
	S22D
BVSU	STADR
STORE	S22UMRL +18D,1
TIX,1	AXT,1
	S22NXTU
DEC	38
LOAD*	MXV
	W +36D,1
	S22UMRL
	W +144D,1
	DLOAD
	S22NXTWI

ERADM= R0 METERS B-29 BOTH EARTH/MOON

COMPUTE RL FROM EQUATION 2.4.10
STORED IN XT89,MPAC B-27,B-29
SCALE RL B-29 FOR BOTH EARTH/MOON

D= UM,RL B-29

SET 0-18D = I BACKWARDS
PD 18
B-3

B-1

B-29
(UM)(RL T) B-30 STORED IN S22UMRL THRU
S22UMRL +17D

(UM)(RL T) B-32

D B-29
SUBTRACT FROM I B-3
U MATRIX B-3
PD 0 AFTER TIX

S1 STILL 6 FROM ABOVE

B-19
B-3

W(I+18)= UM(I) B-19



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USER-S PAGE NO. 42 E5 S3

1675	REF	1		30,2510	00041 1		S22RHO	B-28,B-30
1676				30,2511	60414 0	BOFF	SR2	MAKE RHO B-30
1677	REF	11	LAST	592	30,2512	04343 1	CMOONFLO	
1678					30,2513	60514 1	+1	
1679					30,2514	57101 0	XAD,2	
1680	REF	9	LAST	572	30,2515	00050 1	X2	
1681	REF	10	LAST	593	30,2518	00047 1	X2	
1682					30,2517	41318 0	DMP	
1683	REF	1			30,2520	21650 1	SCTVAR	B+18
1684					30,2521	77742 0	SR1	ACCOUNTS FOR 1/2 IN NEXT FORMULA
1685	REF	2	LAST	593	30,2522	00041 1	STORE S22RHO	1/2(RHO SQ)(VARSC)
1686					30,2523	77770 1	AXT,1	
1687					30,2524	00022 1	DEC	S1 STILL 6 FROM ABOVE
1688					30,2525	64373 1	S22XXA VLOAD*	18
1689	REF	4	LAST	592	30,2526	03524 1	S22XMR	+18D,1 B-3
1690	REF	5	LAST	593	30,2527	03502 0	S22XMR	B-3
1691					30,2530	53781 1	VXSC	VSR*
1692	REF	3	LAST	593	30,2531	00041 1	S22RHO	
1693					30,2532	57212 1	0 -12D,2	WITH VARRP SCALED B-28
1694	REF	1			30,2533	05301 0	STORE S22UUT +18D,1	1/2(RHO SQ)(VARSC)(U)(U T)
1695					30,2534	77300 1	TIX,1 VLOAD	
1696					30,2535	80525 0	S22XXA	
1697	REF	8	LAST	592	30,2538	01235 1	UM	
1698	REF	2	LAST	592	30,2537	34023 1	STCALL S223X1	UM ALSO IN MPAC FOR S2231X13 SUBR.
1699	REF	2	LAST	592	30,2540	61303 0	S2231X13	(UM)(UM T) B-2 IN S22XMR,P17D
1700					30,2541	50545 0	DLOAD SR3	
1701	REF	2	LAST	87	30,2542	02241 1	ERADM	R0 B-29
1702					30,2543	63471 0	DOV DSQ	
1703	REF	3	LAST	592	30,2544	00037 0	S22D	B-29
1704					30,2545	77605 1	DMP	
1705	REF	1			30,2546	02010 1	RPVAR	***** METERS SQ
1706	REF	4	LAST	593	30,2547	00041 1	STORE S22RHO	TEMP (VARRP)(R0/D)
1707					30,2550	77770 1	AXT,1	
1708					30,2551	00022 1	DEC	S1 STILL 6 FROM ABOVE
1709					30,2552	74373 0	S22XXB VLOAD*	18
1710	REF	6	LAST	593	30,2553	03524 1	S22XMR	+18D,1 (UM)(UM T) B-2
1711	REF	5	LAST	593	30,2554	00041 1	S22RHO	
1712					30,2555	77653 1	VAD*	
1713	REF	2	LAST	593	30,2556	01301 1	S22UUT +18D,1	
1714	REF	3	LAST	593	30,2557	05301 0	STORE S22UUT +18D,1	SMALL E MATRIX
1715					30,2580	77775 1	VLOAD	
1716	REF	14	LAST	592	30,2561	15332 1	ZEROVECS	
1717	REF	22	LAST	592	30,2562	06643 0	STORE W +162D,1	CLEAR W8
1718					30,2563	40100 1	TIX,1 ROV	
1719	REF	1			30,2564	60552 0	S22XXB	
1720					30,2585	60568 1	+1	
1721					30,2568	50145 1	DLOAD RAN	
1722	REF	4	LAST	593	30,2567	01277 1	S22UUT +16D	E5
1723	REF	1			30,2570	60607 0	S22W76X	
1724					30,2571	53168 0	SQRT RZE	

L P20-P25

USER=5 PAGE NO. 43 E5 S3

1725	REP	2	LAST	593	30,2572	60807 0				
1726	REP	23	LAST	593	30,2573	16825 1				
1727	REP	5	LAST	593	30,2574	01275 0	STOXL	W +148D		
1728					30,2575	40071 0				
1729	REP	24	LAST	594	30,2576	02825 1	DDV	BOV		
1730	REP	1			30,2577	60801 0				
1731	REP	25	LAST	594	30,2600	02823 1				
1732					30,2601	56345 0	S22W72X	STORE W +148D		W73= E4/W74
1733	REP	6	LAST	594	30,2602	01273 0				
1734	REP	26	LAST	594	30,2603	02825 1	DLOAD	DDV		E3
1735					30,2604	77600 1				
1736	REP	3	LAST	594	30,2605	60807 0				
1737	REP	27	LAST	594	30,2606	02621 0				
1738					30,2607	63545 0	S22W76X	STORE W +144D		W72= E4/W74
1739	REP	28	LAST	594	30,2610	02823 1				
1740					30,2611	50021 1	DLOAD	DSQ		
1741	REP	7	LAST	594	30,2612	01287 0				
1742	REP	1			30,2613	60827 1	BDSU	RMN		
1743					30,2614	53168 0				
1744	REP	2	LAST	594	30,2615	60827 1	SDRT	BZE		
1745	REP	29	LAST	594	30,2616	16631 1				
1746	REP	30	LAST	594	30,2617	02821 0	STOXL	W +152D		W76= SO ROOT (E2-W73 SQ)
1747					30,2620	44205 0				
1748	REP	31	LAST	594	30,2621	02823 1	DMP	W +144D		W72
1749	REP	8	LAST	594	30,2622	01285 1				
1750					30,2623	40071 0				
1751	REP	32	LAST	594	30,2624	02831 1	DDV	BOV		
1752	REP	3	LAST	594	30,2625	60827 1				
1753	REP	33	LAST	594	30,2626	02827 0				
1754					30,2627	63545 0	S22W78X	STORE W +150D		W75= (E1-W72W73)/W76
1755	REP	34	LAST	594	30,2630	02827 0	DLOAD	DSO		
1756					30,2631	63525 0				
1757	REP	35	LAST	594	30,2632	02821 0	PDDL	W +150D		
1758					30,2633	77615 0				
1759					30,2634	50021 1	DAD	W +144D		W72
1760	REP	9	LAST	594	30,2635	01257 0	BDSU	RMN		
1761	REP	1			30,2636	60841 1				
1762					30,2637	77768 0				
1763	REP	36	LAST	594	30,2640	02635 0	SDRT	S22AUT		E0
1764					30,2641	74575 0				
1765	REP	37	LAST	594	30,2642	02621 0	S22SCLW	S22SCLW		
1766	REP	38	LAST	594	30,2643	26821 0				
1767	REP	39	LAST	594	30,2644	02627 0	STOVL	W +156D		W76= SO RT(E0-W72 SQ-W75 SQ)
1768					30,2645	77762 1	VLOAD	VSR1		SCALE W6 METERS R-19
1769	REP	40	LAST	594	30,2646	26827 0				
1770	REP	41	LAST	594	30,2647	02635 0	STOVL	W +144D		
1771					30,2650	77762 1				
1772	REP	42	LAST	594	30,2651	02635 0	VSR1	W +150D		
1773					30,2652	77624 1	STORE	W +156D		
1774	REP	2	LAST	591	30,2653	61322 0	S22SAVET	CALL		
								GETTF		

L P20-P25

USER=5 PAGE NO. 44 E5 S3

1775	REP	2	LAST	123	30,2654	03672 1		STORE	S22IPRIM
1776					30,2655	77776 1	S22I=N	EXIT	
1777	REP	31	LAST	576	30,2656	0 5301 0		TC	PHASCHNG
1778					30,2657	04022 0		OCT	04022
1779	REP	4	LAST	591	30,2660	4 1746 1		CS	8KK
1780	REP	4	LAST	557	30,2661	6 1747 1		AD	8NN
1781					30,2662	0 0006 1		EXTEND	
1782	REP	1			30,2663	8 3126 1		BZAP	S22P244X
1783	REP	5	LAST	595	30,2664	3 1746 0		CA	8KK
1784	REP	71	LAST	566	30,2665	6 4712 1		AD	ONE
1785	REP	6	LAST	575	30,2666	55=300 1		TS	TEMPOR1
1786	REP	4	LAST	591	30,2667	3 1750 1		CA	S22LOC
1787	REP	11	LAST	560	30,2670	6 4716 0		AD	SEVEN
1788	REP	7	LAST	595	30,2671	55=301 0		TS	TEMPOR1 +1
1789	REP	32	LAST	595	30,2672	0 5301 0		TC	PHASCHNG
1790					30,2673	04022 0		OCT	04022
1791	REP	8	LAST	595	30,2674	3 1300 0		CA	TEMPOR1
1792	REP	6	LAST	595	30,2675	55=746 1		TS	8KK
1793	REP	9	LAST	595	30,2676	3 1301 1		CA	TEMPOR1 +1
1794	REP	5	LAST	595	30,2677	55=750 0		TS	S22LOC
1795	REP	100	LAST	590	30,2700	0 6006 1		TC	INTPRET
1796					30,2701	77624 1		CALL	
1797	REP	16	LAST	590	30,2702	27371 1	S2INTS1	INTSTALL	
1798					30,2703	77624 1		CALL	
1799	REP	2	LAST	590	30,2704	61328 1		RON	S22PLGS
1800					30,2705	43014 0			CLEAR
1801	REP	5	LAST	591	30,2706	02706 1			DMENPLG
1802	REP	1			30,2707	60361 0			S22NXTIN
1803	REP	7	LAST	590	30,2710	01676 1			DIM0FLAG
1804					30,2711	43014 0		BOFF	SET
1805	REP	6	LAST	591	30,2712	01751 0			ORFWFLAG
1806	REP	2	LAST	595	30,2713	60361 0			S22NXTIN
1807	REP	6	LAST	595	30,2714	01476 0			DIM0FLAG
1808					30,2715	77614 1		CLRG0	
1809	REP	3	LAST	590	30,2716	01635 0			D6OR9PLG
1810	REP	3	LAST	595	30,2717	60361 0			S22NXTIN
1811					30,2720	77624 1	S22OFF=I	CALL	
1812	REP	3	LAST	594	30,2721	61322 0			GETIP
1813	REP	9	LAST	556	30,2722	27670 0		STOVL	S22TOFF
1814	REP	9	LAST	593	30,2723	01235 1			UM
1815	REP	1			30,2724	35215 1		STCALL	S22UOFF
1816	REP	1			30,2725	60655 1			S22I=N
1817					30,2726	77775 1	S22D=9	VLOAD	
1818	REP	1			30,2727	01701 0			X789
1819					30,2730	14001 0		STOVL	9D
1820	REP	3	LAST	595	30,2731	03672 1			S22IPRIM
1821					30,2732	00007 0		STORE	6D
1822					30,2733	45135 1		SLOAD	CALL
1823	REP	3	LAST	590	30,2734	03674 1			S22EORM
1824	REP	1			30,2735	55366 1	S2RTRP	R-TO-RP	

SAVE PRESENT TIME FOR PIOS
TEST I=N

EXIT TO FIGURE 2.4-4
I=1+1

ADD 7 TO LOC TO GET ADDR. OF NEXT MARK

FOR ALL INTEGRATIONS OTHER THAN FIRST

RETURN ALWAYS EXCEPT OFFSET POINT MARK 1

OFFSET POINT MARK 1, NO W INTEGRATION

OFFSET POINT MARK 1, INTEGRATE W 6X6

TIME SUB OFF

U SUB OFF
TEST I=N
D=9 PATH

CALL PIOS TWICE TO TRANSFORM RL TO TIME
T(SUB P) FROM TIME T PRIME

0=EARTH, NON-ZERO=MOON

L P20-P25

USER=S PAGE NO. 45 E5 S3

1825
1826 REP 4 LAST 595 30,2736 45008 0
1827 30,2737 61322 0
1828 30,2740 00007 0
1829 REP 4 LAST 595 30,2741 45135 1
1830 REP 2 LAST 558 30,2742 03674 1
1831 REP 2 LAST 595 30,2743 55341 1
1832 30,2744 01701 0
1833 REP 7 LAST 573 30,2745 40014 0
1834 30,2746 02464 0
1835 30,2747 60750 0
1836 30,2750 77651 0
1838 REP 6 LAST 591 30,2751 01207 0
1837 REP 7 LAST 573 30,2752 03531 0
1838 30,2753 47256 0
1839 REP 10 LAST 595 30,2754 01235 1
1840 30,2755 40058 0
1841 REP 1 30,2756 60652 0
1842 REP 5 LAST 571 30,2757 01245 0
1843 30,2760 43014 0
1844 REP 6 LAST 595 30,2761 02466 1
1845 REP 11 LAST 578 30,2762 00467 1
1846 30,2763 43345 1
1847 REP 2 LAST 593 30,2764 21650 1
1848 REP 1 30,2765 21652 0
1849 REP 8 LAST 572 30,2766 27526 0
1850 REP 8 LAST 596 30,2767 03531 0
1851 30,2770 60246 1
1852 REP 22 LAST 584 30,2771 00047 1
1853 30,2772 41316 0
1854 REP 9 LAST 596 30,2773 03526 0
1855 30,2774 56070 0
1856 REP 23 LAST 596 30,2775 00046 0
1857 REP 5 LAST 596 30,2776 03673 0
1858 30,2777 53670 0
1859 REP 6 LAST 596 30,3000 03673 0
1860 30,3001 20601 1
1861 30,3002 77751 1
1862 REP 258 LAST 585 30,3003 00155 0
1863 REP 10 LAST 596 30,3004 37526 1
1864 REP 2 LAST 571 30,3005 47047 1
1865 30,3006 57575 1
1866 REP 14 LAST 574 30,3007 03502 0
1867 REP 15 LAST 596 30,3010 37516 1
1868 REP 2 LAST 572 30,3011 75250 1
1869 30,3012 77624 1
1870 REP 13 LAST 591 30,3013 56741 0
1871 30,3014 43014 0
1872 REP 2 LAST 591 30,3015 01342 0
1873 REP 1 30,3016 61047 0
1874 REP 3 LAST 596 30,3017 01262 0

PUSH CALL
GETIF
STORE 6D
SLOAD CALL
S22EORM
RP-TO-R
S22BOX32 STORE X789
SET BOV
INCORPLG
+1
VSU
CSMPOS
STORE RCLP
UNIT VXV
UM
UNIT BOV
S22SAVET
USTAR
S22BOX12 SET SET
DMENPLG
VEHUPPLG
DLOAD DAD
SCTVAR
INUVARR
STOVL VARIANCE
RCLP
ABVAL NORM
X1
DSQ DMP
VARIANCE
XAD,1 XAD,1
X1
S22EORM
XAD,1 SR*
S22EORM
0,1
TLAD
MPAC
STCALL VARIANCE
BVECTORS
VLOAD VCOMP
BVECTOR
STCALL BVECTOR +12D
INCORP1
CALL
GRP2PC
BOFF CLEAR
22DSPFLG
S22BOX42
22DSPFLG

R-TO-RP LEAVES PUSHLOC AT 0

FLAG=1
CLEAR OVERFLOW

RCL=RL-RC
USTAR=UNIT(UNIT(RCL)XUM)

COMPUTATION OVERFLOW,SAVE TP

=1 FOR 9X9 W
=1 FOR CSM

B+18
B+18

B-29 OR B-27

DOUBLE NORM SHIFT SINCE RCLP WAS SQUARED
DOUBLE EARTH OR MOON SHIPT,SAME REASON

SCALE VARIANCE B-40 FOR BOTH EARTH,MOON
CHANGE MODE TO TRIPLE

CALC B0,B1,DELTAQ, NEW USTAR

B2=-B0

=1 DISPLAY DELTA R,V =0 DO NOT



L P20-P25

USER=5 PAGE NO. 46 E5 S3

18741 30,3020 77824 1
18742 REF 14 LAST 596 30,3021 56741 0
1875 30,3022 51575 1
1876 REF 7 LAST 572 30,3023 01257 0
1877 30,3024 53750 0
1878 REF 7 LAST 596 30,3025 03673 0
1879 30,3026 20601 1
1880 REF 9 LAST 575 30,3027 27502 0
1881 REF 8 LAST 597 30,3030 01285 1
1882 30,3031 53846 0
1883 30,3032 20601 1
1884 REF 10 LAST 597 30,3033 03504 0
1885 30,3034 77776 1
1886 REF 1 30,3035 3 3655 1
1887 REF 142 LAST 590 30,3036 0 4555 0
1888 REF 9 LAST 557 30,3037 20763 1
1889 REF 26 LAST 581 30,3040 0 4106 1
1890 30,3041 0 3046 0
1891 REF 1 30,3042 0 3230 0
1892 REF 20 LAST 584 30,3043 3 4710 0
1893 REF 11 LAST 561 30,3044 0 5415 1
1894 REF 76 LAST 575 30,3045 0 5112 0
1895 REF 101 LAST 595 30,3046 0 6006 1
1896 30,3047 77624 1
1897 REF 2 LAST 573 30,3050 75462 0
1898 30,3051 77624 1
1899 REF 2 LAST 591 30,3052 61273 0
1902 30,3053 77414 0
1903 REF 6 LAST 596 30,3054 02744 1
1904 REF 2 LAST 596 30,3055 60652 0
1905 REF 33 LAST 595 30,3058 0 5301 0
1906 30,3057 04022 0
1907 REF 102 LAST 597 30,3060 0 6006 1
1908 30,3081 77214 0
1909 REF 9 LAST 597 30,3062 02664 1
1910 REF 3 LAST 598 30,3063 01701 0
1911 30,3084 77851 0
1912 REF 7 LAST 596 30,3065 01207 0
1913 REF 9 LAST 596 30,3086 37531 1
1914 REF 1 30,3087 60780 0
1915 30,3070 66370 0
1918 30,3071 00086 1
1917 REF 13 LAST 592 30,3072 00051 0
1916 30,3073 00008 1
1919 30,3074 77775 1
1920 REF 15 LAST 593 30,3075 15332 1
1921 REF 43 LAST 594 30,3078 08643 0
1922 30,3077 67300 0
1923 REF 1 30,3100 61076 1
1924 REF 1 30,3101 02007 1

CALL

GRP2PC

VLOAD

ABVAL

DELTAX

LXA,1

SR*

S22EORM

0,1

STOVL

N49DISP

DELTAX +8

ABVAL

SR*

0,1

STORE

N49DISP +2

EXIT

V06N49EE

CAP

BANKCALL

TC

GOFLASHR

CADR

GOTOPOCH

TC

+5

TC

S22EXEX

CAP

BIT3

TC

BLANKET

TC

ENDOFJOB

TC

INTPRET

S22BOX42 CALL

INCRP2

CALL

S22CALRC

DMPINCP2 BOFF

EXIT

INCRFLG

S22SAVET

PHASCHNG

TC

04022

OCT

INTPRET

TC

VLOAD

CLEAR

INCRFLG

X769

VSU

CSMPOS

STCALL

RCLP

S22BOX12

S22BOX22 AXT,1

SSP

DEC

54

DEC

S1

VLOAD

8

CLRW676

STORE

W +162D,1

SLOAD

CLRW676

S22WSUBI,

DELTA R

SCALE DELTA R ALWAYS METERS B-29

DELTA V

DELTA V=METERS/CSEC B-7 ALWAYS

V34E TERMINATE

INCORPORATE CHANGES

V32E RECYCLE

CSMPOS=RC B-29 OR B-27

SAVE TP AND TEST I=N

FLAG=0

RCL=RL-RC

CLEAR W6,W7,W8 (27 ELEMENTS 54 REGS)



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1926	REP	44	LAST	597	30,3102	02621 0	STORE	W +144D
1927	REP	45	LAST	598	30,3103	02631 1	STORE	W +152D
1928	REP	46	LAST	598	30,3104	02641 0	STORE	W +160D
1929					30,3105	43014 0	CLEAR	BOFF
1930	REP	7	LAST	592	30,3106	01663 0		LUNAPLAG
1931	REP	12	LAST	593	30,3107	04343 1		CMOONFLG
1932	REP	1			30,3110	61113 0		S22BX22A
1933					30,3111	77614 1	SET	
1934	REP	8	LAST	598	30,3112	01463 1		LUNAPLAG
1935					30,3113	77624 1	S22BX22A CALL	
1936	REP	5	LAST	596	30,3114	61322 0		GETIP
1937					30,3115	77624 1	CALL	
1938	REP	2	LAST	526	30,3116	26373 1		LALOTORV
1939					30,3117	43175 0	VLOAD	BOFF
1940	REP	5	LAST	591	30,3120	02152 0		ALPHAV
1941	REP	13	LAST	598	30,3121	04343 1		CMOONFLG
1942	REP	1			30,3122	61124 1		S22BX22B
1943					30,3123	77752 1	VSL-2	
1944					30,3124	77650 1	S22BX22B GOTO	
1945	REP	1			30,3125	60744 0		S22BX32
1946	REP	103	LAST	597	30,3126	0 6006 1	S22P244X TC	INTPRET
1947					30,3127	46135 1	S22P244 SLOAD	RHIZ
1948	REP	4	LAST	591	30,3130	02746 0		CXOFF
1949	REP	1			30,3131	61160 1		S22BX44
1950					30,3132	77776 1	EXIT	
1951	REP	34	LAST	597	30,3133	0 5301 0	TC	PHASCHNG
1952					30,3134	04022 0	OCT	04022
1953	REP	104	LAST	598	30,3135	0 6006 1	TC	INTPRET
1954					30,3136	77745 1	DLOAD	
1955	REP	10	LAST	595	30,3137	03670 0		S22TOFF
1956	REP	31	LAST	591	30,3140	34041 0	STCALL	TDEC1
1957	REP	4	LAST	523	30,3141	27022 1		CSMPREC
1958					30,3142	77775 1	VLOAD	
1959	REP	5	LAST	503	30,3143	00017 1		RATT1
1960	REP	8	LAST	597	30,3144	25207 0	STOVL	CSMPOS
1961	REP	2	LAST	595	30,3145	01215 0		S22UOFF
1962	REP	11	LAST	596	30,3146	25235 1	STOVL	UM
1963	REP	4	LAST	597	30,3147	01701 0		X789
1964					30,3150	43046 1	ABVAL	BOFF
1965	REP	14	LAST	598	30,3151	04343 1		CMOONFLG
1966					30,3152	61154 0		+2
1967					30,3153	77702 1	SR2	
1968	REP	3	LAST	593	30,3154	36241 0	STCALL	ERADM
1969	REP	2	LAST	592	30,3155	61240 0		S22P2410
1970					30,3156	77650 1	GOTO	
1971	REP	1			30,3157	61163 1		S22BX44A
1972					30,3160	77624 1	S22BX44 CALL	
1973	REP	6	LAST	598	30,3161	61322 0		GETIP
1974	REP	11	LAST	598	30,3162	03670 0	STORE	S22TOFF
1975					30,3163	77214 0	S22BX44A CLEAR	VLOAD

SET LUNAPLAG, TIME FOR LALOTORV
ERADFLAG, LAT, LONG, ALT SET PREVIOUSLY
CHECK SCALING OF ITEMS, ALT INPUT AND
RL OUTPUT IN ALPHAV BOTH B-29

COMPUTE RL

RL B-29

SCALE RL B-27 FOR MOON

FIG 2.4-4 TEST OFF=0

CALC RC AT OFFSET TIME

RC METERS B-29 OR B-27

U=UOFF

SCALE MOON R0 B-29 FOR S22P2410 SURR

PRESENT TIME FOR LAT-LONG SETUP

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1976	REF	9	LAST	598	30,3184	01683 0		LINAPLAG	
1977	REF	5	LAST	598	30,3185	01701 0		X789	
1978					30,3186	43014 0	BOFF	SET	
1979	REF	15	LAST	598	30,3187	04343 1		CMOONPLG	
1980	REF	1			30,3170	61173 0		S22BX44B	
1981	REF	10	LAST	599	30,3171	01483 1		LINAPLAG	
1982					30,3172	77742 0			
1983	REF	6	LAST	598	30,3173	18152 0	S22BX44B	VSR2	SET = 1 FOR LAT-LONG
1984	REF	12	LAST	598	30,3174	03670 0	STODL	ALPHAV	SCALE RL MOON B-29 FOR LAT-LONG
1985					30,3175	77624 1		S22TOFF	RL SCALED B-29 FOR LAT-LONG
1986	REF	3	LAST	556	30,3176	28322 0		CALL	EITHER PRESENT OR OFFSET TIME
1989					30,3177	77624 1		CALL	**** ALT OUTPUT ALWAYS B-29
1990	REF	1			30,3200	61338 0		LLASRD	DISPLAY LAT/LONG/ALT
1991					30,3201	77776 1		EXIT	
1992	REF	2	LAST	558	30,3202	3 3656 1		CAP	V06N69B
1993	REF	143	LAST	597	30,3203	0 4555 0		TC	BANKCALL
1994	REF	19	LAST	556	30,3204	20624 0		CADR	GOFLASH
1995	REF	1			30,3205	0 3233 0		TC	S22GTP
1996					30,3206	0 3210 1		TC	+2
1997	REF	1			30,3207	0 3224 0		TC	S22.981X
1998	REF	105	LAST	596	30,3210	0 6006 1		TC	INTPRET
1999					30,3211	70740 0	LXC,1	DLOAD*	V34E TERMINATE
2000	REF	6	LAST	595	30,3212	02750 1		S22LOC	PROCEED SAVE LANDING SITE COORD
2001					30,3213	00001 0		0,1	RECYCLE POINT A IN GSOP
2002					30,3214	24007 0	STOVL	6D	
2003	REF	6	LAST	599	30,3215	01701 0		X769	6-TD= LANDING SITE TIME FOR R-TO-RP
2004					30,3216	00001 0	STORE	0D	0-5D= LANDING SITE VEC FOR R-TO-RP
2005					30,3217	45135 1	SLOAD	CALL	
2006	REF	6	LAST	592	30,3220	15330 0		HIDPHALF	ANY NON-ZERO FOR MOON
2007	REF	2	LAST	595	30,3221	55366 1		R-TO-RP	CONVERT RLS TO MOON-FIXED COORD
2008	REF	6	LAST	556	30,3222	02028 1		RLS	LANDING SITE VECTOR
2009					30,3223	77776 1	STORE	EXIT	
2010	REF	106	LAST	599	30,3224	0 6006 1	S22.981X	TC	INTPRET
2011					30,3225	77624 1		CALL	
2012	REF	1			30,3226	61354 1		9DWT06DW	
20121					30,3227	77776 1		EXIT	GO TO POINT A IN CHAPTER 5
20122	REF	107	LAST	599	30,3230	0 6006 1	S22EXEX	TC	WITHOUT CONVERTING W
2013					30,3231	77650 1		GOTO	
2014	REF	3	LAST	569	30,3232	03703 0		S22RTNEX	
20141	REF	106	LAST	599	30,3233	0 6006 1	S22GTP	TC	CONVERT W BEFORE TC GOTOPOOH
20142					30,3234	77624 1		CALL	
20143	REF	2	LAST	599	30,3235	61354 1		9DWT06DW	
20144					30,3236	77776 1		EXIT	
20145	REF	27	LAST	597	30,3237	0 4106 1		TC	GOTOPOOH
2015					30,3240	77201 1	S22F2410	SETPD	COMPUTE FORMULA 2.4.10
2016					30,3241	00001 0		0D	
2017	REF	9	LAST	588	30,3242	01207 0		CSMPOS	RC B-29 EARTH, B-27 MOON
2018					30,3243	50256 0		DOT	UNIT ALSO SETS 36D=ARVAL(RC) USED BELOW
2019	REF	12	LAST	596	30,3244	01235 1		UNIT	



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2020 30,3245 57552 1
2021 30,3246 77808 1
2022 30,3247 44318 0
2023 REP 1 30,3250 21854 0
2024 30,3251 43125 0
2025 REP 4 LAST 598 30,3252 02241 1
2026 REP 16 LAST 599 30,3253 04343 1
2027 30,3254 61256 1
2028 30,3255 77712 0
2029 30,3256 56382 0
2030 30,3257 00045 0
2031 30,3260 45318 1
2032 30,3261 44388 1
2033 30,3262 77805 1
2034 30,3263 00045 0
2035 REP 6 LAST 593 30,3264 00041 1
2036 30,3265 77781 1
2037 REP 13 LAST 599 30,3266 01235 1
2038 30,3267 53352 0
2039 REP 10 LAST 599 30,3270 01207 0
2040 REP 7 LAST 599 30,3271 01701 0
2041 30,3272 77818 0
2042 30,3273 77350 1
2043 REP 8 LAST 597 30,3274 03873 0
2044 REP 2 LAST 574 30,3275 01573 1
2045 30,3276 53257 1
2046 30,3277 20610 1
2047 REP 2 LAST 574 30,3300 01807 1
2048 REP 11 LAST 600 30,3301 01207 0
2049 30,3302 77816 0
2050 REP 1 30,3303 00031 0
2051 30,3304 77131 1
2052 REP 7 LAST 528 30,3305 00052 0
2053 30,3306 00002 0
2054 30,3307 00006 1
2055 30,3310 77770 1
2056 30,3311 00022 1
2057 30,3312 73775 0
2058 REP 2 LAST 600 30,3313 00031 0
2059 REP 3 LAST 593 30,3314 77748 1
2060 REP 7 LAST 593 30,3315 07524 0
2061 30,3316 61110 0
2062 30,3317 77771 0
2063 REP 1 30,3320 61312 0
2064 30,3321 77818 0
2065 30,3322 70740 0
2066 REP 7 LAST 599 30,3323 02750 1
2067 30,3324 00001 0
2068 30,3325 77818 0

SL1 DCOMP
PUSH
DSQ BDSU
DEC1B2
PDDL BOPP
ERADN
CMOONPLG
+2
SL2
SR1R DDV
36D
DSQ DSU
SORT BDSU
DMP
36D
STORE S22RHO
VXSC
UM
VSL2 VAD
CSMPOS
STORE X789
RVO
S22CALRC LXA,1
VLOAD
S22EORM
DELTA CS4
VSR* VAD
7,1
ROVCS4
STORE CSMPOS
RVO
S2231X13 STORE S221X3
SSP AXT,2
S2
DEC 2
DEC 6
AXT,1
DEC 18
S2231NXT VLOAD VXSC*
S221X3
S223X1 +6,2
STORE S22UMRL +18D,1
INCR,1
DEC -6
S2231NXT
RVO
GETIP LXC,1 DLOAD*
S22LOC
0,1
RVO

OSOP CHANGE 8/18/87
PD 2D QD=COSA=-(UM,RC)/ABVAL(RC) B-1

PD 4D 2D=1-COSA SQ=SINA SQ B-2
R0 ALWAYS B-29 FROM SETB

SCALE R0 B-27 FOR MOON
(R0/RC) B-1

PD 2D (R0/RC) SQ - SINA SQ B-2
PD QD COSA-SORTN(R0/RC)SQ-SINA SQ B-1
DMP RESULT B-28 MOON, B-30 EARTH
VXSC RESULT B-29 MOON, B-31 EARTH
RHO FOR W INIT. OF UNKNOWN LMK B-28, B-30

SCALE B-27 MOON, B-29 EARTH AND ADD RC

B-27 FOR EARTH OR B-29 FOR MOON
COMPUTE RC B-29 OR B-27
=0 FOR EARTH, -2 FOR MOON

MULT 3X1 BY 1X3, STORE RESULTING 3X3 IN
S22UMRL- S22UMRL +17D

SET MPAC= TP



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2069				30,3326	43014 0	S22PLGS	SET	SET	INTEGRATION FLAGS
2070	RESP	9	LAST	595	30,3327	01478 0		DIM0FLAG	
2071	RESP	4	LAST	595	30,3330	01475 0		D0OR9PLG	
2072				30,3331	43014 0		SET	SET	
2073	RESP	9	LAST	576	30,3332	01474 1		VINTFLAG	
2074	RESP	2	LAST	576	30,3333	01472 1		STATEPLG	
2075				30,3334	43414 1		CLEAR	RVO	
2076	RESP	9	LAST	578	30,3335	01673 1		INTYPLG	

R2077 SUBROUTINE TO MODIFY ALT AND STORE LAT TO LAT+5 IN LANDLAT TO LANDLAT+5
R2078 PRIOR TO DISPLAY.

2079				30,3336	77745 1	LLASRD	DLOAD		ALT , LANDALT METERS B-29
2080	RESP	4	LAST	274	30,3337	01110 0		ALT	
2081	RESP	3	LAST	277	30,3340	16362 1	STODL	LANDALT	
2082	RESP	5	LAST	276	30,3341	01108 1		LONG	
2083				30,3342	77742 0		SR1		
2084	RESP	3	LAST	277	30,3343	02360 0	STORE	LANDLONG	
2085				30,3344	77618 0		RVO		

R2086 SUBROUTINE TO MODIFY LANDALT AND STORE LANDALT TO LANDALT+5 IN LAT TO
R2087 LAT+5 AFTER LMK DATA LOADED BY ASTRONAUT.

2088				30,3345	77745 1	LLASRD	DLOAD		ALT , LANDALT METERS B-29
2089	RESP	4	LAST	601	30,3346	02362 1		LANDALT	
2090	RESP	5	LAST	601	30,3347	15110 0	STODL	ALT	
2091	RESP	4	LAST	601	30,3350	02360 0		LANDLONG	
2092				30,3351	77752 1		SL1		
2093	RESP	6	LAST	601	30,3352	01108 1	STORE	LONG	
2094				30,3353	77618 0		RVO		
2095				30,3354	40220 0	9DWT06DW	STO	SETPD	
2096	RESP	1		30,3355	01214 1			9DWOX	
2097				30,3356	00001 0			0D	
2098				30,3357	41575 0		VLOAD	PUSH	CLEAR WORKING AREA OF PUSHLIST
2099	RESP	4	LAST	545	30,3360	15332 1		H16ZEROS	INCLUDING P
2100				30,3361	41408 0		PUSH	PUSH	PD 18D
2101				30,3362	77731 1		SSP		
2102	RESP	1		30,3363	00017 1			9DWJ	J=29 USE 2*29 FOR DP WORDS
2103				30,3364	00072 1		DEC	56	
2104				30,3365	66150 0	9DWI=J	LXA,1	SXA,1	SET I=J
2105	RESP	2	LAST	601	30,3366	00016 0		9DWJ	
2106	RESP	1		30,3367	00012 1			9DWI	
2107				30,3370	77624 1	9DWEPCAL	CALL		
2108	RESP	1		30,3371	61808 0			ROWDOT	
2109				30,3372	77750 0		LXA,1		P VARIES 0-20 INSTEAD OF 20-0
2110	RESP	1		30,3373	00010 0			9DWP	
2111	RESP	1		30,3374	08641 1		STORE	EMATRIX +40D,1	
2112				30,3375	66110 1		INCR,1	SXA,1	
2113				30,3376	00002 0		DEC	2	
2114	RESP	2	LAST	601	30,3377	00010 0		9DWP	
2115				30,3400	46135 1		SLOAD	RHIZ	TEST I=0



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2116	REF	2	LAST	601	30,3401	00013 0		gDWI		
2117	REF	1			30,3402	61417 1		gDWTESTJ		
2118					30,3403	77625 0	DSU		I=I-1	
2119	REF	2	LAST	557	30,3404	21646 0		gDWID		
2120	REF	3	LAST	602	30,3405	00013 0	STORE	gDWI		
2121					30,3406	46025 1	DSU	BHIZ	TEST I=26	
2122	REF	1			30,3407	21644 1		gDW26D		
2123	REF	1			30,3410	61413 0		gDWSETJ2		
2124					30,3411	77650 1	GOTO		NEXT E SUB P	
2125	REF	1			30,3412	61370 1		gDWEPICAL		
2126					30,3413	52131 0	gDWSETJ2 SSP	GOTO	I=2	
2127	REF	4	LAST	602	30,3414	00013 0		gDWI		
2128					30,3415	00004 0	DEC	4		
2129	REF	2	LAST	602	30,3416	61370 1		gDWEPICAL		
2130					30,3417	46135 1	gDWTESTJ SLOAD	BHIZ	TEST J=0	
2131	REF	3	LAST	601	30,3420	00017 1		gDWJ		
2132	REF	1			30,3421	61436 1		gDWPIG6		
2133					30,3422	77625 0	DSU			
2134	REF	3	LAST	602	30,3423	21646 0		gDWID		
2135	REF	4	LAST	602	30,3424	00017 1	STORE	gDWJ	J=J-1	
2136					30,3425	46025 1	DSU	BHIZ	TEST J=26	
2137	REF	2	LAST	602	30,3426	21644 1		gDW26D		
2138	REF	1			30,3427	61432 0		gDWSETJ2		
2139					30,3430	77650 1	GOTO			
2140	REF	1			30,3431	61365 0		gDWI=J		
2141					30,3432	52131 0	gDWSETJ2 SSP	GOTO	SET J=2	
2142	REF	5	LAST	602	30,3433	00017 1		gDWJ		
2143					30,3434	00004 0	DEC	4		
2144	REF	2	LAST	602	30,3435	61365 0		gDWI=J		
2145					30,3436	77624 1	gDWPIG6 CALL			
21451	REF	15	LAST	597	30,3437	56741 0		GRP2PC		
21452					30,3440	77331 0	SSP	VLOAD	START OF FIGURE 2.4-6	
2146	REF	6	LAST	602	30,3441	00017 1		gDWJ	J=29	
2147					30,3442	00072 1	DEC	58		
2148	REF	5	LAST	601	30,3443	15332 1		HI6ZEROS		
2149	REF	3	LAST	601	30,3444	00011 1	STORE	gDWP	P,N,I=0	
2150					30,3445	66370 0	AKT,1	SSP		
2151					30,3446	00154 1	DEC	108	CLEAR WO TO W54	
2152	REF	14	LAST	597	30,3447	00051 0		S1		
2153					30,3450	00006 1		6		
2154	REF	47	LAST	598	30,3451	06555 1	CLEARW54 STORE	W +108D,1		
2155					30,3452	77700 0	TX,1			
2156	REF	1			30,3453	61451 0		CLEARW54		
2157					30,3454	66150 0	gDWI=JA LXA,1	SXA,1	I=J	
2158	REF	7	LAST	602	30,3455	00016 0		gDWJ		
2159	REF	5	LAST	602	30,3456	00012 1		gDWI		
2160					30,3457	77624 1	CALL			
2161	REF	2	LAST	601	30,3460	61606 0		ROWDOT		
2162					30,3461	43750 1	LXA,1	POS**		
2163	REF	4	LAST	602	30,3462	00010 0		gDWP		



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2164	REF	2	LAST	601	30,3463	02841 0		EMATRIX +40D,1	
2165					30,3464	66110 1	INCR,1	SXA,1	-(P+1)
2166					30,3465	00002 0		2	
2167	REF	5	LAST	602	30,3466	00010 0		9DWP	
2168					30,3467	54140 0	LXC,1	XSU,1	-(I+N)
2169	REF	6	LAST	602	30,3470	00012 1		9DWI	
2170	REF	1			30,3471	00014 1		9DWN	
2171					30,3472	71244 0	BPL	DLOAD	TEST WSO LTE 0
2172	REF	1			30,3473	61477 1		9DWAAA	
2173	REF	6	LAST	602	30,3474	15332 1		H16ZEROS	W=0
2174					30,3475	77650 1	GOTO		
2175	REF	1			30,3476	61500 0		9DWAAB	
2176					30,3477	77766 0	9DWAAA	9DWAAB	W= SORT(WSO)
2177	REF	48	LAST	602	30,3500	06401 1	9DWAAB	9DWAAB	
2178	REF	1			30,3501	14001 0	STORE	W,1	
2179	REF	8	LAST	602	30,3502	00017 1	STODL	WORKW	
2180					30,3503	77630 1		9DWJ	TEST J=0
2181	REF	1			30,3504	61572 0	RHIZ		
2182					30,3505	46135 1	TST2I=0	9DWEXITX	EXIT
2183	REF	7	LAST	603	30,3506	00013 0	SLOAD	RHIZ	TEST I=0
2184	REF	1			30,3507	61550 0		9DWI	
2185					30,3510	77625 0		9DWN=N+3	
2186	REF	4	LAST	602	30,3511	21646 0	DSU		
2187	REF	6	LAST	603	30,3512	00013 0		9DWID	
2188					30,3513	46025 1	STORE	9DWI	I=I-1
2189	REF	3	LAST	602	30,3514	21644 1	DSU	RHIZ	TEST I=26
2190	REF	1			30,3515	61520 1		9DW26D	
2191					30,3516	77650 1	GOTO	9DWAAC	
2192	REF	1			30,3517	61523 1		9DWNEXBP	
2193					30,3520	77731 1	9DWAAC	SSP	I=2
2194	REF	9	LAST	603	30,3521	00013 0		9DWI	
2195					30,3522	00004 0		4	
2196					30,3523	77624 1	9DWNEXBP	CALL	
2197	REF	3	LAST	602	30,3524	61606 0		ROWDOT	
2198					30,3525	43750 1	LXA,1	BDSUM	(BP-ROWI*ROWJ)/W
2199	REF	6	LAST	603	30,3526	00010 0		9DWP	
2200	REF	3	LAST	603	30,3527	02641 0		EMATRIX +40D,1	
2201					30,3530	62071 0	DDV	INCR,1	P=P+1
2202	REF	2	LAST	603	30,3531	00001 0		WORKW	
2203					30,3532	00002 0		2	
2204					30,3533	70130 1	SXA,1	LXC,1	
2205	REF	7	LAST	603	30,3534	00010 0		9DWP	
2206	REF	10	LAST	603	30,3535	00012 1		9DWI	
2207					30,3536	40060 0	XSU,1	ROV	-(I+N)
2208	REF	2	LAST	603	30,3537	00014 1		9DWN	
2209	REF	1			30,3540	61543 1		SETWIN=0	
2210					30,3541	77650 1	GOTO		
2211	REF	1			30,3542	61545 1		9DWSFTWX	
2212					30,3543	77745 1	SETWIN=0	DLOAD	W(I+N)=0
2213	REF	7	LAST	603	30,3544	15332 1		H16ZEROS	



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2214	REP	49	LAST	603	30,3545	06401 1	gDWSSTWX	STORE	W,1
2215					30,3546	77650 1		GOTO	
2216	REP	1			30,3547	61505 0			TST2I=0
2217					30,3550	62150 1	gDWN=N+3	LXA,1	INCR,1
2218	REP	3	LAST	603	30,3551	00014 1			gDWN
2219					30,3552	00006 1			6
2220					30,3553	67330 0		SXA,1	SLOAD
2221	REP	4	LAST	604	30,3554	00014 1			gDWN
2222	REP	9	LAST	603	30,3555	00017 1			gDWJ
2223					30,3556	77625 0		DSU	
2224	REP	5	LAST	603	30,3557	21646 0			gDWID
2225	REP	10	LAST	604	30,3560	00017 1		STORE	gDWJ
2226					30,3561	46025 1		DSU	PHIZ
2227	REP	4	LAST	603	30,3562	21644 1			gDW26D
2228	REP	1			30,3563	61566 0			SETJ=2A
2229					30,3564	77650 1		GOTO	
2230	REP	1			30,3565	61454 0			gDWI=JA
2231					30,3566	52131 0	SETJ=2A	SSP	GOTO
2232	REP	11	LAST	604	30,3567	00017 1			gDWJ
2233					30,3570	00004 0			4
2234	REP	2	LAST	604	30,3571	61454 0			gDWI=JA
2235					30,3572	77624 1	gDWEXITX	CALL	
22351	REP	16	LAST	602	30,3573	56741 0			GRP2PC
22352					30,3574	66370 0		AXT,1	SSP
2236					30,3575	00066 1		DEC	54
2237	REP	15	LAST	602	30,3576	00051 0			51
2238					30,3577	00006 1			6
2239					30,3600	77775 1		VLOAD	
2240	REP	6	LAST	603	30,3601	15332 1			HI6ZEROS
2241	REP	50	LAST	604	30,3602	06643 0	gDWE00XA	STORE	W +162D,1
2242					30,3603	52100 1		TIX,1	GOTO
2243	REP	1			30,3604	61602 1			gDWE00XA
2244	REP	2	LAST	601	30,3605	01214 1			gDWOX
2245					30,3606	40131 0	ROWDOT	SSP	BOV
2246	REP	1			30,3607	00007 0			XIMP1
2247					30,3610	00377 1		OCT	377
2248					30,3611	61612 0			+1
2249					30,3612	71140 1		LXC,1	LXC,2
2250	REP	11	LAST	603	30,3613	00012 1			gDWI
2251	REP	12	LAST	604	30,3614	00016 0			gDWJ
2252					30,3615	41545 0		DLOAD	PUSH
2253	REP	9	LAST	604	30,3616	15332 1			HI6ZEROS
2254					30,3617	56743 1	ROWDOT1	DLOAD*	DMPR*
2255	REP	51	LAST	604	30,3620	02401 0			W,1
2256	REP	52	LAST	604	30,3621	75376 1			W,2
2257					30,3622	41415 1		DAD	PUSH
2258					30,3623	62000 0		BOV	INCR,1
2259	REP	1			30,3624	61640 1			ROWDOT3
2260					30,3625	77771 0		DEC	-6
2261					30,3626	67314 0		INCR,2	SLOAD

N=N+3

J=J-1

TEST J=26

J=2

CLEAR W6,W7,W8 USED TEMP FOR EMATRIX



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2262				30,3627	77771 0	DEC	-8		
2263	REF	2	LAST	604	30,3630	00007 0	XTMP1		
2264				30,3631	70430 1	RHIZ	SR1		
2265	REF	1			30,3632	61636 0	ROWDOT2		
2266	REF	3	LAST	605	30,3633	00007 0	STORE	XTMP1	
2267				30,3634	77650 1	GOTO			
2268	REF	1			30,3635	61617 0	ROWDOT1		
2269				30,3636	77745 1	ROWDOT2	DLOAD		
2270				30,3637	77616 0	RVD			
2271				30,3640	77614 1	ROWDOT3	CLRG0		
2272	REF	7	LAST	595	30,3641	01631 1	ORWFLAG		
2273	REF	2	LAST	605	30,3642	61636 0	ROWDOT2		
2274				0000		WORKW	=	0D	
2275				0006		XTMP1	=	6D	
2276				0010		9DWP	=	8D	P
2277				0012		9DWI	=	10D	I
2278				0014		9DWN	=	12D	N
2279				0016		9DWJ	=	14D	J
2280	REF	3	LAST	596	1214	9DWX	=	S2ZUFP	
2281	REF	16	LAST	596	E7,1501	S2ZUMRL	=	BVECTOR	16
2282	REF	9	LAST	597	1256	S2ZUUT	=	DELTA	18
2283				0022		S223X1	=	18D	6
2284				0030		S221X3	=	24D	6
2285				0036		S22D	=	30D	2
2286				0040		S22RHO	=	32D	2
2287	REF	53	LAST	604	E5,1634	S22RL	=	W +156D	6
2289				30,3643	00064 0	9DW26D	2DEC	52 B-14	
2290				30,3644	00000 1				
2291				30,3645	00002 0	9DWID	2DEC	2 B-14	
2292				30,3646	00000 1				
2293				30,3647	10306 0	SCTVAR	2DEC	1.0 E-6 B+16	
2294				30,3650	36750 0				
2295				30,3651	00253 0	IMUARR	2DEC	0.04 E-6 B+16	
2296				30,3652	31436 1				
2297				30,3653	10000 0	DEC1B2	2DEC	1 B-2	
2298				30,3654	00000 1				
2299				30,3655	01461 0	V06N49EE	VN	00649	
2300	REF	5	LAST	574	1214	V06N69B	VN	00669	
2301	REF	2	LAST	565	23,2000	S2ZUFP	=	LEMPOS	6
				23,3136		SETLOC	P20S2		U SUB OPT
						BANK			



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P2371

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R2372 SUBROUTINE NAME' V89CALL
R2373 MOD NO' 0 DATE' 8 FEB 1988
R2374 MOD BY' DIGITAL DEVEL GROUP LOG SECTION' P20-P25

R2375 FUNCTIONAL DESCRIPTION'

R2376 CALLED BY VERB 89 ENTER DURING P00. Prio 10 USED. CALCULATES AND
R2377 DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R2378 $(UNIT(Z)COS55 \text{ DEG} + UNIT(X)SIN55 \text{ DEG})$ AT LM.

R2379 1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R2380 EXIT R63, OTHERWISE CONTINUE.

R2381 2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R2382 ORIENTATION KNOWN TO CGC, CONTINUE.

R2383 3. FLASH DISPLAY V 04 N 08. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R2384 BE POINTED AT LM. INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R2385 ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R2386 AFTER KEYING IN PROCEED.

R2387 4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R2388 FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R2389 5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R2390 R63COMP JOB'

R2391 UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R2392 CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM 3SM TO LM.

R2393 DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R2394 ARE STORED FOR LATER R60CSM CALL.

R2395 6. FLASH DISPLAY V 08 N18 AND AWAIT RESPONSE.

R2396 7. RECYCLE- RETURN TO STEP 5.
R2397 TERMINATE- EXIT R63 ROUTINE
R2398 PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.
R2399 CALLING SEQUENCE' V 89 E

R2400 SUBROUTINES CALLED' CHKPOCH, R02BOTH, G0XDSPP, R63COMP, R60CSM

R2401 ALARMS 1. OPERATOR ERROR IF NOT IN P00
R2402 2. PROGRAM ALARM IF IMU IS OFF
R2403 3. PROGRAM ALARM IF IMU ORIENTATION IS UNKNOWN

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R2404 ERASABLE INITIALIZATION REQUIRED: NONE

R2405 DEBRIS' OPTION1, OPTION1+1, PRPTKAT(PREP ATT FLAG),P21TIME, 3AXISPLG
24055 23,3138 00000 1 DP1MIN 2DSC 6000
24055 23,3137 13560 0

2406 REP 13 LAST 566 E4,1715
2407 34,3801
2408 REP 2 LAST 582 34,2000
2409 34,3601
2410 REP 1

EBANK= P21TIME
BANK 34
SETLOC P20S4
BANK

2411 REP 144 LAST 599 34,3801 0 4555 0 V89CALL

COUNT* \$5/R83

2412 REP 3 LAST 555 34,3802 17573 0

TC BANKCALL

2413 REP 19 LAST 565 34,3803 3 6214 0

CADR R02BOTH

2414 REP 3 LAST 516 34,3804 55-131 1

CAP THREE

2415 REP 72 LAST 595 34,3805 3 4712 1

TS OPTION1

2416 REP 4 LAST 608 34,3806 55-132 1

CAP ONE

2417 REP 1 34,3807 3 3850 1

TS OPTION1 +1

2418 REP 145 LAST 608 34,3810 0 4555 0

CAP VB04N06

2419 REP 20 LAST 599 34,3811 20624 0

TC BANKCALL

2420 REP 26 LAST 511 34,3812 0 5423 1

CADR GOFLASH

2421 34,3813 0 3815 0

TC ENDEXT

2422 34,3814 0 3807 0

TC +2

A2423 REP 5 LAST 606 34,3815 4 1132 1

TC -5

2425 REP 73 LAST 606 34,3816 6 4712 1

CS OPTION1 +1

2426 34,3817 0 0006 1

AD ONE

2427 REP 1 34,3820 1 3845 1

EXTEND

2428 REP 31 LAST 565 34,3821 0 5447 0

BZP SETPAP

2429 REP 2 LAST 54 34,3822 00120 1

TC DOWNFLAG

2430 REP 109 LAST 599 34,3823 0 6006 1

ADRES R03SCPLG

2431 34,3824 43234 0

TC INTRET

2432 REP 17 LAST 563 34,3825 45505 0

RTB DAD

24325 REP 1 34,3826 07137 0

LOADTIME

2433 REP 14 LAST 606 34,3827 36316 0

DP1MIN

2434 REP 1 34,3830 71461 1

STCALL P21TIME

2435 34,3831 77776 1

R83COMP

2436 REP 1 34,3832 3 3851 0

EXIT

2437 REP 146 LAST 608 34,3833 0 4555 0

CAP VB06N18

2438 REP 21 LAST 606 34,3834 20624 0

TC BANKCALL

2439 REP 27 LAST 608 34,3835 0 5423 1

CADR GOFLASH

2440 34,3836 0 3640 0

TC ENDEXT

2441 REP 1 34,3837 0 3623 0

TC +2

2442 REP 32 LAST 606 34,3840 0 5447 0

TC V89RECL

2443 REP 4 LAST 564 34,3841 00124 0

TC DOWNFLAG

ADRES 3AXISPLG

IMU STATUS CHECK. RETURNS IF ORIENTATION
KNOWN. ALARMS IF NOT.
ALLOW ASTRONAUT TO SELECT DESIRED
TRACKING ATTITUDE AXIS.

V 04 N 06

TERMINATE
PROCEED
DATA IN. OPTION1 +1 = 1 FOR PREP AXIS
= 2 FOR X AXIS
1 FOR PREP AXIS. 2 FOR X AXIS.

RESET PREP ATT FLAG FOR R83COMP
TO DO X AXIS. RESET BIT 10 FLAG 5

READ PRESENT TIME
INTEGRATE TO 1 MIN FROM NOW
STORE TIME FOR CALL TO R83COMP. R83COMP
LEAVES DESIRED GIM ANG IN THETAD,LOS IN
POINTVM, AND SELECTED AXIS IN SCAXIS.
V 06 N 18
NOUN 18 REFERS TO THE DESIRED GIMBAL

TERMINATE
PROCEED
RECYCLE
RESET 3 AXIS FLAG
RESET BIT 6 FLAG 5



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2444	REP	147	LAST	608	34,3842	0 4555 0	TC	BANKCALL
2445	REP	3	LAST	585	34,3843	56000 1	CADR	R30CSM
2446	REP	28	LAST	606	34,3844	1 5423 0	TCF	ENDEXT
2447	REP	30	LAST	585	34,3845	0 5435 0	SETPAF	TC
2448	REP	3	LAST	606	34,3846	00120 1	ADRES	UPFLAG
2449	REP	2	LAST	608	34,3847	0 3823 0	TC	R03SCFLG
2450					34,3850	01008 0	VB04N06	V69RZCL
2451					34,3851	01422 1	VB06N18	VN 0406
								VN 0616
2452	REP	2	LAST	583	34,3461		R03COMP	EQUALS R63

PERFORMS CSM MANEUVER TO ALIGN SELECTED SPACECRAFT AXIS TO LOS.

SET PREFERRED ATT FLAG FOR R03COMP TO DO PREP AXIS. SET BIT 10 FLAG 5.

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P2453 PROGRAM NAME- P23 Cislunar MIDCOURSE NAVIGATION
P2454 MOD NO
P2455 MOD BY- TOM KNATT
P2456 FUNCTIONAL DESCRIPTION- DO MIDCOURSE NAVIGATION BY INCORPORATION OF STAR
P2457 /EARTH AND STAR/MOON OPTICAL MEASUREMENTS.
P2458 CALLING SEQUENCE- ASTRONAUT OPERATED
P2459 SUBROUTINES CALLED-R52,R53,R57,R80,ORBITAL INTEGRATION (INTEGRV)
P2460 INCORP1, INCORP2, LALOTORV, LUNLMKLD, AND DISPLAY INTERFACE ROUTINES.
P2461 NORMAL EXIT MODES- VIA ROO
P2462 ALARMS- NONE
P2463 ABORT MODES- NONE
P2464 ERASABLE INITIALIZATION REQUIRED- PAD-LOADED ERASABLES, ORDWFLAG RESET,
P2465 REFSMPLG=0 IF IMU OFF AND REFSMPLG=1 IF IMU ON
P2466 INPUTS BY USER REQUIRED- STAR NUMBER, LANDMARK LAT, LONG/2, ALT OR ID NUMB.
P2467 IF LANDMARK IS USED, NEAR OR FAR HORIZON IF HORIZON IS USED, AND
P2468 BODY TO BE MARKED ON (EARTH OR MOON). SEE GSOP CHART 4.
P2469 OUTPUT-UPDATED CMC STATE VECTOR. VECTOR FROM S/C TO HORIZON OR LANDMARK
P2470 IN POINTAXS. POINTAXS CAN BE USED TO GENERATE THIS VECTOR APART FROM
P2471 P23 IF DESIRED.
P2472 DEBRIS-NO USABLE DEBRIS IS GENERATED. RENDWFLAG IS RESET FOR P20 UPON
P2473 COMPLETION OF P23. RUPTREGS AND ERASABLES USED BY DISPLAYS ARE DEBRIS

2467	REF	1		31,2021				BANK	31		
2468				31,2000				SETLOC	RT23		
2469				31,2021				BANK			
2470	REF	1						COUNT	31/S23		
2471	REF	54	LAST	605	R5,1400			EBANK	= W		
24712	REF	33	LAST	608	31,2021	0 5447 0	P23	TC	DOWNFLAG		
24714	REF	4	LAST	555	31,2022	00010 0		ADRES	RNDVZFLAG		
2472	REF	10	LAST	590	31,2023	0 5261 1		TC	2PHSCHNG		
2473					31,2024	00004 0		OCT	00004		LEAVE GROUP 4
2474					31,2025	00012 1		OCT	00012		ENTER GROUP 2
2475	REF	1			31,2026	3 4760 1		CAF	PRIO13		
2476	REF	3	LAST	569	31,2027	55=056 1		TS	PHSPROT2		
2477	REF	110	LAST	608	31,2030	0 6006 1		TC	INTPRET		
2478					31,2031	43131 0		SSP	CLEAR		
2479	REF	5	LAST	556	31,2032	00302 0			MARKINDX		
2480					31,2033	00001 0			1		
2481	REF	2	LAST	555	31,2034	00666 1		CLEAR	TARG2FLAG		TARGET FLAG USED BY R52 AND R53
2482					31,2035	66214 0			SSP		
2483	REF	3	LAST	554	31,2036	00665 1			TARG1FLAG		
2484	REF	3	LAST	202	31,2037	00305 1			STARIND		
2485					31,2040	00000 1			0		
2486					31,2041	43131 0		SSP	CLEAR		
2487	REF	6	LAST	209	31,2042	00303 1			BESTI		
2488					31,2043	00000 1			0		
24882	REF	1			31,2044	03267 1		CLEAR	R57FLAG		SET = DO NOT REPERFORM R57
24883					31,2045	77414 0			EXIT		
24884	REF	2	LAST	260	31,2046	04664 1			V94FLAG		SET = ALLOW V94
24885	REF	111	LAST	610	31,2047	0 6006 1	P23.00	TC	INTPRET		

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2489				31,2050	45014 0
2490	REP	4	LAST	31,2051	01702 0
2491	REP	1		31,2052	62080 0
2492	REP	1		31,2053	76360 0
2493				31,2054	77624 1
2494	REP	1		31,2055	31322 0
2495				31,2056	77650 1
2496	REP	1		31,2057	62236 1
2500				31,2060	77414 0
2501	REP	1		31,2061	04665 0
2502	REP	1		31,2062	3 3050 1
2503	REP	148	LAST	31,2063	0 4555 0
2504	REP	22	LAST	31,2064	20624 0
2505	REP	28	LAST	31,2065	0 4106 1
2506	REP	1		31,2066	0 2070 1
2507				31,2067	0 2062 1
2508	REP	19	LAST	31,2070	3 1751 0
2509				31,2071	0 0006 1
2510				31,2072	1 2074 1
2511				31,2073	0 2075 1
2512	REP	4	LAST	31,2074	3 1752 0
2513	REP	23	LAST	31,2075	7 4703 0
2514				31,2076	0 0006 1
2515	REP	1		31,2077	1 2104 1
2516	REP	112	LAST	31,2100	0 6006 1
2517				31,2101	52014 0
2518	REP	11	LAST	31,2102	01463 1
2519	REP	1		31,2103	62107 0
2520	REP	113	LAST	31,2104	0 6006 1
2521				31,2105	77614 1
2522	REP	12	LAST	31,2106	01663 0
2523				31,2107	41535 1
25231	REP	5	LAST	31,2110	00736 0
25232				31,2111	41335 1
25233	REP	1		31,2112	23055 0
25234				31,2113	66150 0
25235	REP	259	LAST	31,2114	00155 0
25236	REP	7	LAST	31,2115	00302 0
25237				31,2116	77624 1
25238	REP	1		31,2117	30000 1
25239	REP	2	LAST	31,2120	02617 0
252395				31,2121	77776 1
2524	REP	20	LAST	31,2122	3 1751 0
2525	REP	1		31,2123	7 3052 1
2526	REP	2	LAST	31,2124	55-753 0
2527	REP	5	LAST	31,2125	3 1752 0
2528				31,2126	0 0006 1
2529	REP	1		31,2127	1 2144 0
2530	REP	30	LAST	31,2130	7 4706 0
2531				31,2131	0 0006 1

BON	CALL
	REFSMPLG
	P23.05
	RS7
CALL	
	RS3
GOTO	
	P23.60
P23.05	CLEAR
	EXIT
	SAVECFLG
CAP	V05N70
TC	BANKCALL
CADR	GOFLASH
TC	GOTOPOOH
TC	P23.15
TC	-5
P23.15	CA
	LANDMARK
	EXTEND
	BZF
	+2
TC	+2
CA	HORIZON
MASK	BITS
EXTEND	
BZF	P23.16
TC	INTPRET
SET	GOTO
	LUNAPLAG
	P23.17
P23.16	TC
	INTPRET
	CLEAR
	LUNAPLAG
P23.17	SLOAD
	PUSH
	STARCODE
	SLOAD
	DMP
	SPSIX
LXA,1	SXA,1
	MPAC +1
	BESTI
CALL	
	LOWMEMRY
STORE	STARS2V2
EXIT	
CA	LANDMARK
MASK	OCT00077
TS	IDOPLMK
CA	HORIZON
EXTEND	
BZF	P23.12
MASK	BITS
EXTEND	

SET NOW AS INPUT, NORMALLY EXTERNAL CONT
WHEN ALIGNED, PERFORM MEASUREMENT
DO OPTICS CALIBRATION IF IMU NOT ALIGNED

USED TO SAVE SPACE IN P23.65
REQUEST RESPONSE AND DISPLAY MEASUREMENT
IDENTIFICATION- STAR, LMK, HOR IDENT.

TERMINATE

REDISPLAY
IF C=2, LUNAPLAG=1. IF C=1, LUNAPLAG=0

SET LUNAPLAG FROM HORIZON OR LANDMARK

BESTI = 6XSTAR NUMBER

NEEDED TO RETRIEVE STAR VECTOR FROM LOW
STORE FOR RS3, P23. US(IN P23)=STARS2V2

FOR R3(DR) LUNAPLAG ALREADY SET

IF D=1, NORPHOR=0 (NEAR), D=2, NORPHOR=1, FAR



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2532	REP	1		31,2132	1 2137 1		BZF	P23.16
2533	REP	114	LAST	611	31,2133	0 8008 1	TC	INTPRET
2534					31,2134	52014 0	SET	GOTO
2535	REP	1			31,2135	00084 0		NORPHOR
2536	REP	1			31,2136	62142 1		P23.19
2537	REP	115	LAST	612	31,2137	0 8008 1	P23.16 TC	INTPRET
2538					31,2140	77814 1	CLEAR	
2539	REP	2	LAST	612	31,2141	00284 1		NORPHOR
2540					31,2142	77776 1	P23.19 EXIT	
2544	REP	1			31,2143	0 2156 1	TC	P23.30
2545	REP	3	LAST	611	31,2144	3 1753 1	CA	IDOPLMK
2546					31,2145	0 0006 1	EXTEND	
2547	REP	1			31,2146	1 2150 0	BZF	P23.20
2548	REP	2	LAST	612	31,2147	0 2156 1	TC	P23.30
2549	REP	1			31,2150	3 3047 1	P23.20 CAP	V8N69
2550	REP	149	LAST	611	31,2151	0 4555 0	TC	BANKCALL
2551	REP	23	LAST	611	31,2152	20824 0	CADR	GOTFLASH
2552	REP	29	LAST	611	31,2153	0 4108 1	TC	GOTOPOOH
2553	REP	3	LAST	612	31,2154	0 2156 1	TC	P23.30
2554	REP	2	LAST	612	31,2155	0 2150 1	TC	P23.20
2555	REP	116	LAST	612	31,2156	0 8008 1	P23.30 TC	INTPRET
2556					31,2157	77414 0	BQN	EXIT
2557	REP	2	LAST	611	31,2160	04705 1		SAVECPLG
2558	REP	1			31,2161	62285 1		P23.85
2559	REP	1			31,2162	3 3053 1	CAP	V50N25P
2560	REP	150	LAST	612	31,2163	0 4555 0	TC	BANKCALL
2561	REP	1			31,2164	20751 0	CADR	GOPERP1
2562	REP	30	LAST	612	31,2165	0 4108 1	TC	GOTOPOOH
2563	REP	2	LAST	207	31,2166	0 2173 0	TC	V94ENTER
2564	REP	1			31,2167	0 2170 0	TC	P23.55
2565	REP	117	LAST	612	31,2170	0 8008 1	P23.55 TC	INTPRET
2566					31,2171	77850 1	GOTO	
2567	REP	1			31,2172	62224 1		P23.56
R2568		VERB	94	BEGINS HERE				
2569	REP	116	LAST	612	31,2173	0 8006 1	V94ENTER TC	INTPRET
2570					31,2174	77634 0	RTB	
2571	REP	16	LAST	606	31,2175	45505 0		LOADTIME
2572	REP	8	LAST	577	31,2176	35225 1	STCALL	MARKTIME
2573	REP	1			31,2177	62272 1		POINTXAS
2574					31,2200	53521 1	MOV	UNIT
2575	REP	17	LAST	566	31,2201	01736 1		REFSMAT
2576	REP	4	LAST	566	31,2202	27357 0	STOVL	POINTVSM
2577	REP	1			31,2203	23056 0		JCAXIS
2578	REP	14	LAST	587	31,2204	03351 0	STORE	SCAXIS
2579					31,2205	77776 1	EXIT	
2580	REP	34	LAST	610	31,2206	0 5447 0	TC	DOWNFLAG
2581	REP	5	LAST	606	31,2207	00124 0	ADRES	3AXISFLG
2584	REP	1			31,2210	3 3063 1	CAP	R80ADRS
2585	REP	3	LAST	197	31,2211	54 374 0	TS	TEMPFLSH
2586	REP	35	LAST	598	31,2212	0 5301 0	TC	PHASCHNG

IF R2(DE) NONZERO, LMK IS IDENTIFIED

LANDMARK NOT IDENTIFIED

LANDMARK IS IDENTIFIED

REQUEST RESPONSE AND DISPLAY LMK DATA
R1=LAT,R2=LONG/2,R3=ALT

TERMINATE

STORE NEW DATA AND REDISPLAY

GOPERP1 BLANKS OUT R2 AND R3.

PROCEED. AUTOCONTROL. CMC
ENTER. MANUAL CONTROL

READ CLOCK

RETURN LOS IN RCLL AND MPAC

CLEAR AND GO TO VEGPOINT IN R60.
BIT 6 FLAG 5

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USER-S PAGE NO. 62

RS 53

2587				31,2213	00012 1		OCT	00012
25871	REF 151	LAST 612		31,2214	0 4555 0	R80CALL	TC	BANKCALL
25872	REF 4	LAST 609		31,2215	56000 1		CADR	R80CSN
25873	REF 36	LAST 612		31,2216	0 5301 0		TC	PHASCHNG
25874				31,2217	04022 0		OCT	04022
2588	REF 119	LAST 612		31,2220	0 6006 1		TC	INTPRET
2589				31,2221	77614 1		BQN	
2590	REF 2	LAST 610		31,2222	03307 0			RS7FLAG
2591	REF 1			31,2223	62226 0			P23.57
2592				31,2224	77624 1	P23.56	CALL	
2593	REF 2	LAST 611		31,2225	76360 0			RS7
2594				31,2226	43014 0	P23.57	SET	SET
2595	REF 3	LAST 610		31,2227	04464 0			V94FLAG
2596	REF 3	LAST 613		31,2230	03067 0			RS7FLAG
2597				31,2231	77624 1		CALL	
2596	REF 3	LAST 556		31,2232	30002 0			RS2
2606				31,2233	43014 0		CLEAR	CLEAR
2609	REF 4	LAST 613		31,2234	04664 1			V94FLAG
2610	REF 4	LAST 613		31,2235	03267 1			RS7FLAG
2611				31,2236	77776 1	P23.60	EXIT	
2612				31,2237	0 0004 0		INHINT	
2613	REF 32	LAST 590		31,2240	3 1330 0		CA	MARKSTAT
2614	REF 6	LAST 413		31,2241	7 4747 0		MASK	LOW10
2615	REF 5	LAST 591		31,2242	55=242 0		TS	MARKDATA
2616				31,2243	0 0006 1		EXTEND	
2617	REF 6	LAST 613		31,2244	5 1242 1		INDEX	MARKDATA
2616				31,2245	3 0001 0		DCA	0
2619	REF 9	LAST 612		31,2246	53=225 1		DXCH	MARKTIME
2620	REF 7	LAST 613		31,2247	51=242 1		INDEX	MARKDATA
2621				31,2250	3 0005 1		CA	5
2622	REF 1			31,2251	57=754 0		XCH	TRUNION
2623				31,2252	0 0003 1		RELINT	
2624	REF 1			31,2253	3 3051 0		CAP	V05N71
2625	REF 152	LAST 613		31,2254	0 4555 0		TC	BANKCALL
2626	REF 24	LAST 612		31,2255	20624 0		CADR	GOFASH
2627	REF 31	LAST 612		31,2256	0 4106 1		TC	GOTOPOCH
2626	REF 1			31,2257	0 2261 0		TC	P23.65
2629				31,2260	0 2253 1		TC	-5
2630	REF 120	LAST 613		31,2261	0 6006 1	P23.65	TC	INTPRET
2631				31,2262	77414 0		SET	EXIT
2632	REF 3	LAST 612		31,2263	04465 1			SAVECFLG
2633	REF 2	LAST 611		31,2264	0 2070 1		TC	P23.15
2639				31,2265	45014 0	P23.85	CLEAR	CALL
2640	REF 8	LAST 590		31,2266	02676 1			RENDWFLG
2641	REF 2	LAST 612		31,2267	62272 1			POINTAXS
2642				31,2270	77650 1		GOTO	
2643	REF 1			31,2271	62364 1			R23.55
R2644	WE BEGIN CALCULATIONS HERE							
R2645	POINTAXIS SUBROUTINE							
2646				31,2272	67220 0	POINTAXS STO		SLOAD

DO NOT REPERFORM RS7

TERMINATE
STORE DATA
REDISPLAY

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2647	REP	5	LAST	576	31,2273	01150 1		
2648	REP	21	LAST	611	31,2274	02752 0		
26481					31,2275	67230 1		
26482	REP	1			31,2276	62307 1		
26483	REP	4	LAST	612	31,2277	02754 0		
2649					31,2300	45030 0		
2650	REP	1			31,2301	62305 0		
2651	REP	1			31,2302	63064 0		
2652					31,2303	77650 1		
2653	REP	2	LAST	614	31,2304	62307 1		
2654					31,2305	77624 1	R23.0	CALL
2655	REP	2	LAST	558	31,2306	61345 1		
2656					31,2307	71214 0	R23.05	BCN
2657	REP	8	LAST	605	31,2310	01711 1		
2658	REP	1			31,2311	62315 1		
26582	REP	1			31,2312	03001 0		
26584					31,2313	34001 1		
2659	REP	2	LAST	570	31,2314	56544 1		
2660					31,2315	77624 1	R23.1	CALL
2661	REP	6	LAST	573	31,2316	56343 0		
2662					31,2317	43014 0		
2663	REP	9	LAST	614	31,2320	01751 0		
2664	REP	1			31,2321	62323 1		
2665	REP	10	LAST	601	31,2322	01476 0		
2666					31,2323	45014 0	R23.2	SET
2667	REP	10	LAST	614	31,2324	01471 1		
2668	REP	9	LAST	591	31,2325	27113 1		
2669					31,2326	77776 1		
2670	REP	37	LAST	613	31,2327	0 5301 0		
2671					31,2330	04022 0		
2672	REP	121	LAST	613	31,2331	0 6006 1		
2673					31,2332	77624 1		
2674	REP	1			31,2333	62767 0		
2675					31,2334	77214 0		
2676	REP	1			31,2335	00345 0		
2677	REP	1			31,2336	62341 0		
2678	REP	4	LAST	87	31,2337	02272 1		
2679	REP	2	LAST	119	31,2340	03627 1		
2680					31,2341	46135 1	R23.3	STORE
2681	REP	22	LAST	614	31,2342	02752 0		
2682	REP	1			31,2343	62353 0		
2683					31,2344	77614 1		
2684	REP	5	LAST	591	31,2345	00462 1		
2685					31,2346	45145 0		
2686	REP	10	LAST	613	31,2347	01225 0		
2687	REP	3	LAST	596	31,2350	26373 1		
2688					31,2351	77650 1		
2689	REP	1			31,2352	62355 0		
2690					31,2353	77624 1	R23.4	CALL
2691	REP	1			31,2354	62527 0		

POINTEX
LANDMARK
SLOAD
R23.05
IDOPLMK
CALL
R23.0
LUNLMKLD

RHIZ

RHIZ

GOTO

R23.05

CALL

BCN

ORDWFLAG

R23.1

WMDPOS

STCALL

INITIALW

CALL

SETINTG

SET

ORDWFLAG

R23.2

DIM0FLAG

CALL

ORDWFLAG

INTEGRV

EXIT

PHASCHNG

OCT

INTPRET

CALL

RECT.1

VLOAD

ZMEASURE

R23.3

ROVV

STORE

R2C

RHIZ

LANDMARK

R23.4

SET

ERADFLAG

CALL

MARKTIME

LALOTORV

GOTO

R23.5

CALL

HORIZ

IF LANDMARK=0 HORIZON IS DESIRED.
DO NOT PICK UP LMK VALUES FROM TABLE
OR DISPLAY IN HORIZON CASE

MUST BE DONE 2ND TIME, TO ALLOW CHANGES

INITIALIZE W-MATRIX FIRST PASS IN P23

SETUP FOR CSM INTEGRATION

INTEGRATE CSM STATE VEC. TO MARKTIME

PICKUP CSM STATE VECTOR FROM PERM

IN SPHERE OF INFLUENCE OF PRIMARY BODY

CALCULATED BY INTEGRATION P29

IF LANDMARK = 0, USE HORIZ SUBR



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2692	REP	2	LAST	119	31,2355	03665 1	R23.5	STORE	RL
2693					31,2356	40251 0		VSU	SETPD
2694	REP	3	LAST	614	31,2357	03627 1			RZC
2695					31,2360	00001 0			0
2696	REP	2	LAST	119	31,2361	03657 0		STORE	RCLL
2697					31,2362	77650 1		GOTO	
2698	REP	6	LAST	614	31,2363	01150 1			POINTEX

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PC	OP	OPN	OPND	OPND2	OPND3	OPND4	OPND5	OPND6	OPND7	OPND8	OPND9	OPND10	OPND11	OPND12	OPND13	OPND14	OPND15	OPND16	OPND17	OPND18	OPND19	OPND20	OPND21	OPND22	OPND23	OPND24	OPND25	OPND26	OPND27	OPND28	OPND29	OPND30	OPND31	OPND32	OPND33	OPND34	OPND35	OPND36	OPND37	OPND38	OPND39	OPND40	OPND41	OPND42	OPND43	OPND44	OPND45	OPND46	OPND47	OPND48	OPND49	OPND50	OPND51	OPND52	OPND53	OPND54	OPND55	OPND56	OPND57	OPND58	OPND59	OPND60	OPND61	OPND62	OPND63	OPND64	OPND65	OPND66	OPND67	OPND68	OPND69	OPND70	OPND71	OPND72	OPND73	OPND74	OPND75	OPND76	OPND77	OPND78	OPND79	OPND80	OPND81	OPND82	OPND83	OPND84	OPND85	OPND86	OPND87	OPND88	OPND89	OPND90	OPND91	OPND92	OPND93	OPND94	OPND95	OPND96	OPND97	OPND98	OPND99	OPND100	OPND101	OPND102	OPND103	OPND104	OPND105	OPND106	OPND107	OPND108	OPND109	OPND110	OPND111	OPND112	OPND113	OPND114	OPND115	OPND116	OPND117	OPND118	OPND119	OPND120	OPND121	OPND122	OPND123	OPND124	OPND125	OPND126	OPND127	OPND128	OPND129	OPND130	OPND131	OPND132	OPND133	OPND134	OPND135	OPND136	OPND137	OPND138	OPND139	OPND140	OPND141	OPND142	OPND143	OPND144	OPND145	OPND146	OPND147	OPND148	OPND149	OPND150	OPND151	OPND152	OPND153	OPND154	OPND155	OPND156	OPND157	OPND158	OPND159	OPND160	OPND161	OPND162	OPND163	OPND164	OPND165	OPND166	OPND167	OPND168	OPND169	OPND170	OPND171	OPND172	OPND173	OPND174	OPND175	OPND176	OPND177	OPND178	OPND179	OPND180	OPND181	OPND182	OPND183	OPND184	OPND185	OPND186	OPND187	OPND188	OPND189	OPND190	OPND191	OPND192	OPND193	OPND194	OPND195	OPND196	OPND197	OPND198	OPND199	OPND200	OPND201	OPND202	OPND203	OPND204	OPND205	OPND206	OPND207	OPND208	OPND209	OPND210	OPND211	OPND212	OPND213	OPND214	OPND215	OPND216	OPND217	OPND218	OPND219	OPND220	OPND221	OPND222	OPND223	OPND224	OPND225	OPND226	OPND227	OPND228	OPND229	OPND230	OPND231	OPND232	OPND233	OPND234	OPND235	OPND236	OPND237	OPND238	OPND239	OPND240	OPND241	OPND242	OPND243	OPND244	OPND245	OPND246	OPND247	OPND248	OPND249	OPND250	OPND251	OPND252	OPND253	OPND254	OPND255	OPND256	OPND257	OPND258	OPND259	OPND260	OPND261	OPND262	OPND263	OPND264	OPND265	OPND266	OPND267	OPND268	OPND269	OPND270	OPND271	OPND272	OPND273	OPND274	OPND275	OPND276	OPND277	OPND278	OPND279	OPND280	OPND281	OPND282	OPND283	OPND284	OPND285	OPND286	OPND287	OPND288	OPND289	OPND290	OPND291	OPND292	OPND293	OPND294	OPND295	OPND296	OPND297	OPND298	OPND299	OPND300	OPND301	OPND302	OPND303	OPND304	OPND305	OPND306	OPND307	OPND308	OPND309	OPND310	OPND311	OPND312	OPND313	OPND314	OPND315	OPND316	OPND317	OPND318	OPND319	OPND320	OPND321	OPND322	OPND323	OPND324	OPND325	OPND326	OPND327	OPND328	OPND329	OPND330	OPND331	OPND332	OPND333	OPND334	OPND335	OPND336	OPND337	OPND338	OPND339	OPND340	OPND341	OPND342	OPND343	OPND344	OPND345	OPND346	OPND347	OPND348	OPND349	OPND350	OPND351	OPND352	OPND353	OPND354	OPND355	OPND356	OPND357	OPND358	OPND359	OPND360	OPND361	OPND362	OPND363	OPND364	OPND365	OPND366	OPND367	OPND368	OPND369	OPND370	OPND371	OPND372	OPND373	OPND374	OPND375	OPND376	OPND377	OPND378	OPND379	
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L P20-P25

2738	REP	1		31,2445	23038 0			TRUN19
2739				31,2446	00041 1			320
2740				31,2447	52405 1		DMP	SL3
2741	REP	2	LAST	566	31,2450	07107 0		PI/4.0
2742					31,2451	62414 1	BOFF	SL2
2743	REP	17	LAST	600	31,2452	04343 1		CMOONFLG
2744	REP	1			31,2453	62454 0		R23.51
2745	REP	4	LAST	573	31,2454	17524 1	R23.51	STOVL DELTAQ
2746					31,2455	00037 0		30D
2747					31,2456	47005 1	DMP	RTB
2748	REP	1			31,2457	23045 1		TRUNVAR
2749	REP	2	LAST	572	31,2460	45562 1		TPMODE
27491					31,2461	77771 0	TAD	
27492	REP	2	LAST	616	31,2462	23042 0		VARSUBL
2750	REP	11	LAST	596	31,2463	03526 0	STORE	VARIANCE
2751					31,2464	45014 0	CLEAR	CALL
2752	REP	7	LAST	596	31,2465	02666 0		DMENFLG
2753	REP	3	LAST	596	31,2466	75250 1		INCRP1
27531					31,2467	77624 1	CALL	
27532	REP	17	LAST	604	31,2470	56741 0	VLOAD	GRP2PC
2754					31,2471	51575 1		ABVAL
2755	REP	10	LAST	605	31,2472	01265 1		DELTAX +6
2756					31,2473	60414 0	BOF	SR2
2757	REP	16	LAST	617	31,2474	04343 1		CMOONFLG
2758	REP	1			31,2475	62476 0		R23.52
2759	REP	11	LAST	597	31,2476	27504 0	R23.52	STOVL N49DISP +2
2760	REP	11	LAST	617	31,2477	01257 0		DELTAX
2761					31,2500	77646 0	ABVAL	
2762					31,2501	60414 0	BOF	SR2
2763	REP	19	LAST	617	31,2502	04343 1		CMOONFLG
2764	REP	1			31,2503	62504 1		R23.53
2765	REP	12	LAST	617	31,2504	03502 0	R23.53	STORE N49DISP
2766					31,2505	77776 1	EXIT	
2767	REP	1			31,2506	3 3046 0	R23.6	V6N49
2768	REP	153	LAST	613	31,2507	0 4555 0	CAP	BANKCALL
2769	REP	10	LAST	597	31,2510	20763 1	CADR	GOFLASHR
2770	REP	1			31,2511	0 2506 0	TC	R23.6
2771	REP	1			31,2512	0 2521 0	TC	R23.7
2772	REP	1			31,2513	0 2047 0	TC	P23.00
2773	REP	21	LAST	597	31,2514	3 4710 0	CAP	BIT3
2774	REP	12	LAST	597	31,2515	0 5415 1	TC	BLANKET
27741	REP	38	LAST	614	31,2516	0 5301 0	TC	PHASCHNG
27742					31,2517	00012 1	OCT	00012
2775	REP	77	LAST	597	31,2520	0 5112 0	TC	ENDOFJOB
2776	REP	123	LAST	616	31,2521	0 6006 1	R23.7	TC
2777					31,2522	45014 0	R23.8	SET
2778	REP	12	LAST	596	31,2523	00467 1		VERUPFLG
2779	REP	3	LAST	597	31,2524	75462 0		INCRP2
2780					31,2525	77776 1	EXIT	
2781	REP	32	LAST	613	31,2526	0 4106 1	R23.END	TC

ROLL * ROLL

DISPLAY IS 2-27 IF IN LUNAR SPHERE

DONT ALLOW
INCORPORATE DATA
RECYCLE FOR ANOTHER MARK
BLANK OUT R3



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USER'S PAGE NO. 67 E5 83

2783				31,2527	40220 0	HORIZ	STO	SETPD	
2784	REF	1		31,2530	03672 1			SRRETURN	
2785				31,2531	00001 0			0	
2786				31,2532	65345 0		DLOAD	PDOL	PUSH 0-1 = -AYO SCALED B0
2787	REF	1		31,2533	01714 1			-AYO	
2788	REF	1		31,2534	01716 0			AXO	
2789				31,2535	63325 0		PDOL	PDVL	PUSH 2-3 = +AX SCALED B0
2790	REF	6	LAST	31,2536	15340 1			DPPOS MAX	
2791	REF	2	LAST	31,2537	02617 0			US	
2792				31,2540	53435 0		VXV	UNIT	
2793	REF	4	LAST	31,2541	03627 1			RZC	
2794	REF	2	LAST	31,2542	27621 1		STOVL	UBAR2	
2795				31,2543	53435 0		VXV	UNIT	PUSH UP
2796	REF	3	LAST	31,2544	03621 1			UBAR2	
2797	REF	2	LAST	31,2545	27605 1		STOVL	UBAR0	
2798	REF	4	LAST	31,2546	03621 1			UBAR2	
2799				31,2547	53435 0		VXV	UNIT	
2800	REF	3	LAST	31,2550	03605 1			UBAR0	
2801	REF	2	LAST	31,2551	03613 0		STORE	UBAR1	
2802				31,2552	50214 0		BCN	DOT	
2803	REF	13	LAST	31,2553	01703 1			LUNAFLAG	
2804	REF	1		31,2554	62752 0			HORIZ.6	
2805				31,2555	00001 0			0	UBAR1 DOT UZ
2806	REF	7	LAST	31,2556	36156 0		STCALL	ALPHAV +4	
2807	REF	1		31,2557	26437 0			GETERAD	
2808				31,2560	65215 1		DAD	PDOL	MPAC HAS RADIUS OF FISHER ELLIPSOID
2809	REF	1		31,2561	01355 0			HORIZALT	PUSH 0-1 = RH SCALED B29
2810	REF	1		31,2562	23032 1			AEARTH	
2811				31,2563	41415 1		DAD	PUSH	PUSH 2-3 = AH B29
2812	REF	2	LAST	31,2564	01355 0			HORIZALT	
2813				31,2565	64375 1	HORIZ.1	VLOAD	MXV	
2814	REF	5	LAST	31,2566	03627 1			RZC	B29
2815	REF	4	LAST	31,2567	03605 1			UBAR0	B1
2816				31,2570	63372 1		VSL1	PDVL	PUSH 4-9 = RH(XH,YH,ZH) B29
2817	REF	3	LAST	31,2571	02617 0			US	
2818				31,2572	76521 0		MXV	VSL1	
2819	REF	5	LAST	31,2573	03605 1			UBAR0	
2820				31,2574	77725 1		PDOL		PUSH 10-15 = USH B1
2821				31,2575	00003 1			2	AH
2822				31,2576	14043 0		STOVL	34D	
2823				31,2577	00005 1			4	XH
2824				31,2600	77624 1		CALL		
2825	REF	1		31,2601	62756 1			DIVIDE	
2826				31,2602	41257 1		SR*	DMP	
2827				31,2603	20611 0			8D,1	NOW SCALED B9
2828	REF	261	LAST	31,2604	00155 0			MPAC	
2829				31,2605	14037 0		STOVL	30D	
2830				31,2606	00001 0			0	
2831				31,2607	14043 0		STOVL	34D	
2832				31,2610	00007 0			6	YH



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2633			31,2611	77624 1
2634	REP 2	LAST 618	31,2612	62756 1
2635			31,2613	41257 1
2636			31,2614	20611 0
2637	REP 262	LAST 618	31,2615	00155 0
2638			31,2616	41415 1
2639			31,2617	00037 0
2640			31,2620	75425 0
2641	REP 1		31,2621	23040 1
2642			31,2622	77725 1
2643			31,2623	00021 1
2644			31,2624	14043 0
2645			31,2625	00005 1
2646			31,2626	77624 1
2647	REP 3	LAST 619	31,2627	62756 1
2648			31,2630	65257 1
2649			31,2631	20622 0
2650			31,2632	00007 0
2651			31,2633	77624 1
2652	REP 4	LAST 619	31,2634	62756 1
2653			31,2635	65257 1
2654			31,2636	20622 0
2655			31,2637	00021 1
2656			31,2640	14043 0
2657			31,2641	00023 0
2658			31,2642	77624 1
2659	REP 5	LAST 619	31,2643	62756 1
2660			31,2644	77657 0
2661			31,2645	20611 0
2662			31,2646	14035 1
2663			31,2647	00001 0
2664			31,2650	14043 0
2665			31,2651	00003 1
2666			31,2652	77624 1
2667	REP 6	LAST 619	31,2653	62756 1
2668			31,2654	41257 1
2669			31,2655	20601 1
2670			31,2656	00035 1
2671			31,2657	72405 0
2672			31,2660	00007 0
2673			31,2661	77725 1
2674			31,2662	00003 1
2675			31,2663	14043 0
2676			31,2664	00001 0
2677			31,2665	77624 1
2678	REP 7	LAST 619	31,2666	62756 1
2679			31,2667	41257 1
2680			31,2670	20601 1
2681			31,2671	00035 1
2682			31,2672	72405 0

CALL	DIVIDE	
SR*	DMP	B9
	8D,1	B16
DAD	MPAC	PUSH 16-17 =A SCALED B16
	PUSH	
DSU	30D	
	SORT	
	1.0B18	
PDOL		PUSH 16-19 Sqrt(A-1) B9
	16D	
STODL	34D	
	4	XH
CALL	DIVIDE	
SR*	PDOL	
	17D,1	PUSH 20-21 = XH/A B29
	6	YH
CALL	DIVIDE	
SR*	PDOL	
	17D,1	PUSH 22-23 = YH/A B29
	16D	A
STODL	34D	
	18D	Sqrt(A-1)
CALL	DIVIDE	
SR*		
	8D,1	
STODL	28D	
	0	BH
STODL	34D	
	2	AH
CALL		
	DIVIDE	
SR*	DMP	AH/BH SCALED B1
	0,1	
	28D	Sqrt(A-1)/A
DMP	SL1	
	6	YH
PDOL		
	2	AH
STODL	34D	
	0	
CALL		
	DIVIDE	
SR*	DMP	BH/AH SCALED B1
	0,1	
	28D	Sqrt(A-1)/A
DMP	SL1	



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2883		31,2673	00005 1		4	XH
2884		31,2674	43325 1	PDDL	DAD	
2885		31,2675	00025 0		20D	XH/A
2886		31,2676	00031 0		24D	ALPHA
2887		31,2677	45325 1	PDDL	DSU	
2888		31,2700	00027 1		22D	YH/A
2889		31,2701	00033 1		26D	BETA
2890		31,2702	40206 1	PUSH	SETPD	
2891		31,2703	00021 1		16D	
2892		31,2704	45345 1	DLOAD	DSU	
2893		31,2705	00025 0		20D	XH/A
2894		31,2706	00031 0		24D	ALPHA
2895		31,2707	43325 1	PDDL	DAD	
2896		31,2710	00027 1		22D	YH/A
2897		31,2711	00033 1		26D	BETA
2898		31,2712	41525 0	PDDL	PUSH	
2899	REF 18 LAST 616	31,2713	15332 1		ZEROVECS	
2900		31,2714	24041 1	STOVL	32D	ZERO THIRD COMP. OF T-0 VECTOR
2901		31,2715	00035 1		28D	
2902		31,2716	53451 1	VSU	UNIT	
2903		31,2717	00005 1		4	RH VECTOR
2904		31,2720	63241 0	DOT	POVL	PUSH 22-23 A-SUB-ZERO
2905		31,2721	00013 0		10D	USH VECTOR
2906		31,2722	00021 1		16D	T1 VECTOR
2907		31,2723	53451 1	VSU	UNIT	
2908		31,2724	00005 1		4	RH VECTOR
2909		31,2725	41441 0	DOT	PUSH	PUSH 24-25 A-SUB-ONE
2910		31,2726	00013 0		10D	
2911		31,2727	50021 1	BDSU	RVN	
2912		31,2730	00027 1		22D	A-SUB-ZERO
2913	REF 1	31,2731	62740 0		HORIZ.3	
2914		31,2732	77614 1	BQN		
2915	REF 3 LAST 612	31,2733	00304 0		NORPHOR	
2916	REF 1	31,2734	62744 1		HORIZ.4	
2917		31,2735	52175 0	HORIZ.2	VLOAD	GOTO
2918		31,2736	00035 1		28D	T-0 VECTOR
2919	REF 1	31,2737	62746 0		HORIZ.5	
2920		31,2740	52014 0	HORIZ.3	BQN	GOTO
2921	REF 4 LAST 620	31,2741	00304 0		NORPHOR	
2922	REF 1	31,2742	62735 1		HORIZ.2	
2923	REF 2 LAST 620	31,2743	62744 1		HORIZ.4	
2924		31,2744	77775 1	HORIZ.4	VLOAD	
2925		31,2745	00021 1		16D	T1 VECTOR
2926		31,2746	76505 0	HORIZ.5	VXM	VSL1
2927	REF 6 LAST 618	31,2747	03605 1		UBAR0	
2928		31,2750	77650 1		GOTO	
2929	REF 2 LAST 618	31,2751	03672 1		SRRRETURN	
2930		31,2752	41545 0	HORIZ.6	DLOAD	PUSH
2931	REF 1	31,2753	23034 1		RADMOON	
2932		31,2754	52006 0	PUSH	GOTO	

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2933	REF	1	31,2755	62565 0	DIVIDE	NORM	HORIZ.1	
2934			31,2756	70501 1			SD1	
2935	REF	24	31,2757	00047 1			X1	
2936			31,2760	14045 0		STOVL	360	
2937			31,2761	00043 0			340	
2938			31,2762	55301 0		NORM	EDOV	
2939	REF	16	31,2763	00051 0			S1	
2940			31,2764	00045 0			360	
2941			31,2765	43460 1		XSU,1	R/O	
2942	REF	17	31,2766	00050 1			S1	
2943			31,2767	77014 1	RECT.1	BOFF	AXT,2	
2944	REF	20	31,2770	04343 1			CHORFLO	
2945	REF	1	31,2771	63001 0			RECT.3	
2946			31,2772	77775 1		DEC	-2	
2947			31,2773	77614 1		BOFF		
2948	REF	14	31,2774	01743 0			LINAPLAG	
2949	REF	1	31,2775	63005 1			RECT.4	
2950			31,2776	52014 0	RECT.2	CLEAR	GOTO	
2951	REF	2	31,2777	00265 0			ZMEASURE	
2952	REF	1	31,3000	63007 0			RECT.5	
2953			31,3001	43174 1	RECT.3	AXT,2	BOFF	
2954			31,3002	00000 1			0	
2955	REF	15	31,3003	01743 0			LINAPLAG	
2956	REF	1	31,3004	62776 0			RECT.2	
2957			31,3005	77614 1	RECT.4	SET		
2958	REF	3	31,3006	00065 1			ZMEASURE	
2959			31,3007	44575 0	RECT.5	VLOAD	VSR*	
2960	REF	3	31,3010	01573 1			DELTA CS*	SCALED B22 OR B18
2961			31,3011	53257 1		VSR*	VAD	
2962			31,3012	57176 0			0,2	
2963	REF	3	31,3013	01607 1			NOVCS*	SCALED B29 OR B27
2964			31,3014	77657 0		VSR*		
2965			31,3015	57176 0			0,2	
2966	REF	6	31,3016	27627 1		STOVL	R/C	NOW SCALED B29
2967	REF	1	31,3017	01601 1			NOVCS*	SCALED B3 OR B-1
2968			31,3020	53702 1		VSR*	VSR*	
2969			31,3021	57176 0			0,2	
2970			31,3022	53655 1		VAD	VSR*	
2971	REF	1	31,3023	01615 1			NOVCS*	SCALED B7 OR B5
2972			31,3024	57176 0			0,2	
2973	REF	4	31,3025	03635 1		STORE	VZC	NOW SCALED B7
2974			31,3026	77616 0		R/O		
2975			31,3027	26305 0	ONE/C	2DEC*	.333564049 E-6	B+21*
2976			31,3030	05432 1				
2977			31,3031	00302 0	AEARTH	2DEC	6378166 B-29	A AXIS OF EARTH(METERS B-29)
2978			31,3032	24533 1				
2979			31,3033	00065 1	RADMOON	2DEC	1732590 B-29	RADIUS OF MOON IN METERS
2980			31,3034	01265 1				
2981			31,3035	01604 1	TRUN19	OCT	01604	
2982			31,3036	00000 1	TRUN19A	OCT	00000	

SR TO SET ZMEASURE = 0 IF MEASUREMENT
PLANET AND PRIMARY PLANET ARE THE SAME
OTHERWISE = 1

VEC. AND SCALE B29 AND B7

SCALED B22 OR B18

SCALED B29 OR B27

NOW SCALED B29
SCALED B3 OR B-1

SCALED B7 OR B5

NOW SCALED B7



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2980		31,3037	00000 1	1.0B18	2DEC	1.0 B-16	
2980		31,3040	02000 0				
29805		31,3041	00000 1	VARSUBL	DEC	0	
298055		31,3042	01505 0	VARSUBL3	2DEC*	3.4299040 E+8 B-28*	
298055		31,3043	14100 0				
29806		31,3044	00012 1	TRUNVAR	2DEC	2.5 E-9 B+18	
29806		31,3045	27462 1				
2981		31,3046	01461 0	V6N49	VN	0649	
2982		31,3047	01531 1	V6N89	VN	0889	
2983		31,3050	01306 0	V05N70	VN	0570	
2984		31,3051	01307 1	V05N71	VN	0571	
2985		31,3052	00077 1	OCT00077	OCT	00077	
2986		31,3053	00202 1	V50N25P	OCT	00202	
2987		31,3054	00006 1	SPSIX	OCT	00008	
2988		31,3055	10461 0	JCAXIS	2DEC	-268849805	TRACK AXIS
2988		31,3056	21675 0				
2989		31,3057	00000 1		2DEC	0	
2989		31,3060	00000 1				
2990		31,3061	15375 1		2DEC	.421895725	
2990		31,3062	02004 1				
2991	REF 1	31,3063	62217 1	R80ADRS	CADR	R80CALL +3	
2992		31,3064	77735 0	LUNLAKLD	SLOAD		
2994	REF 5 LAST 614	31,3065	02754 0			IDOFMK	
2995		31,3066	45230 1		BHIZ	DSU	
2996	REF 1	31,3067	63101 1			LNLAKEND	
2997	REF 6 LAST 604	31,3070	21646 0			9DWID	
2998		31,3071	70152 0		SL1	LXC,1	
2999	REF 263 LAST 619	31,3072	00154 1			MPAC	
3000		31,3073	64743 0		DLOAD*	PDDL*	
3001	REF 2 LAST 557	31,3074	23705 1			ALTTAB,1	
3002	REF 2 LAST 558	31,3075	23623 1			LONGTAB,1	
3003		31,3076	55523 0		PDDL*	VDEF	
3004	REF 2 LAST 556	31,3077	23541 0			LATTAB,1	
3005	REF 6 LAST 558	31,3100	01104 0		STORE	LAT	
3006		31,3101	77616 0	LNLAKEND	RVO		
3007	REF 1	14,2000			SETLOC	RT53	
3008		14,2000			BANK		
3009		14,2000	43573 1	LOWMEMRY	VLOAD*	RVO	
3010	REF 1	14,2001	31744 1			CATLOG,1	
3011		4550			BLOCK	02	
3012		4550	0 0006 1	GOTOV56	EXTEND		
3013	REF 1	4551	3 4554 1		DCA	VB56CADR	
3014	REF 3 LAST 369	4552	1 5122 1		TCF	SUPDXCHZ	
3015	REF 4 LAST 208	E7,1777			BRANK=	WHOCARES	
3016	REF 2 LAST 230	4553	02637 1	VB56CADR	2CADR	TRACKTRM	
3016		4554	66107 1				
3017	REF 1	4000			SETLOC	FPTAG2	
3018		4555			BANK		
3019	REF 1				COUNT*	SS/P20	
5000		40,3574			BANK	40	

P20 TERMINATES BY GOTOV56 INSTEAD OF
GOTOPOCH



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5001	REF	1		40,3574			SETLOC	ENDPINS1
5002				40,3574			BANK	
5003	REF	1					COUNT*	SS/EXTVB
5004	REF	124	LAST	617	40,3574	0 6006 1	V67CALL	TC
5005					40,3575	77624 1	CALL	INTPRET
5006	REF	1			40,3576	61656 0		V67WW
5007					40,3577	77776 1	EXIT	
5008	REF	1			40,3600	3 3732 1	V08N99DS	CAP
5009	REF	154	LAST	617	40,3601	0 4555 0		V08N99A
5010	REF	12	LAST	510	40,3602	20465 1	TC	BANKCALL
5011	REF	29	LAST	609	40,3603	1 5423 0	CADR	GOMDSPP
5012	REF	1			40,3604	0 3610 0	TC	ENDEXT
5013	REF	31	LAST	609	40,3605	0 5435 0	TC	V08N9933
5014	REF	1			40,3606	00210 1	TC	UPFLAG
5015	REF	1			40,3607	0 3600 1	ADRES	V67FLAG
5016	REF	125	LAST	623	40,3610	0 6006 1	V08N9933	V08N99DS
5017					40,3611	77414 0	TC	INTPRET
5018	REF	2	LAST	623	40,3612	04701 0	BN	EXIT
5019					40,3613	61615 1		V67FLAG
5020	REF	30	LAST	623	40,3614	1 5423 0	TC	+2
5021					40,3615	41345 0	TC	ENDEXT
5022	REF	2	LAST	276	40,3616	02321 0	DLOAD	DMP
5023	REF	1			40,3617	21734 1		WWPOS
5025					40,3620	71350 1	LXA,1	1/SORT3
5026	REF	264	LAST	622	40,3621	00154 1		DLOAD
5027	REF	2	LAST	278	40,3622	02323 1		MPAC
5028					40,3623	73005 0	DMP	WWVEL
5029	REF	2	LAST	623	40,3624	21734 1		LXA,2
5030	REF	265	LAST	623	40,3625	00154 1		1/SORT3
5036					40,3626	45335 0	SLOAD	MPAC
5037	REF	2	LAST	276	40,3627	02325 1		DSU
5038	REF	1			40,3630	21736 0		WWOPT
5039					40,3631	51030 0	RHIZ	V67DEC2
5040	REF	1			40,3632	61641 0		BPL
5041	REF	1			40,3633	61646 1		V67WORB
5043					40,3634	67130 1	SXA,1	V67WMID
5044	REF	2	LAST	570	40,3635	02000 0		SXA,2
5045	REF	1			40,3636	02001 1		WRENDPOS
5046					40,3637	77650 1	GOTO	WRENDVEL
5047	REF	1			40,3640	61651 1		V67EXITX
5048					40,3641	67130 1	V67WORB	SXA,2
5049	REF	2	LAST	591	40,3642	02004 1		WORBPOS
5050	REF	2	LAST	591	40,3643	02005 0		WORBVEL
5051					40,3644	77650 1	GOTO	
5052	REF	2	LAST	623	40,3645	61651 1		V67EXITX
5053					40,3646	67130 1	V67WMID	SXA,2
5054	REF	2	LAST	614	40,3647	03000 1		WMIDPOS
5055	REF	1			40,3650	03001 0		WMIDVEL
5056					40,3651	43014 0	V67EXITX	CLEAR
5057	REF	11	LAST	614	40,3652	01671 0		ORWFLAG



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5058	REP	9	LAST	613	40,3853	02676 1		RENDWPLG
5059					40,3854	77776 1	EXIT	
5060	REP	31	LAST	623	40,3855	1 5423 0	TCP	ENDEXT
5061					40,3856	40020 1	STO	BOV
5062	REP	8	LAST	600	40,3857	00051 0		S2
5063					40,3860	61661 1		+1
5064					40,3861	45014 0	CLEAR	CALL
5065	REP	3	LAST	623	40,3862	04661 1		V67FLAG
5066	REP	17	LAST	595	40,3863	27371 1		INTSTALL
5067					40,3864	71331 0	SSP	DLOAD
5068	REP	18	LAST	621	40,3865	00051 0		S1
5069					40,3866	00006 1	DEC	6
5070	REP	19	LAST	620	40,3867	15332 1		ZEROVECS
5071	REP	3	LAST	623	40,3870	02321 0	STORE	WWPOS
5072	REP	3	LAST	623	40,3871	02323 1	STORE	WWVEL
50721	REP	3	LAST	623	40,3872	02325 1	STORE	WWOPT
5073					40,3873	77770 1	AXT,1	
5074					40,3874	00044 1	DEC	36
5075					40,3875	47573 0	MXPOSVEL	VLOAD* VSQ
5076	REP	55	LAST	610	40,3876	02445 0		W +38D,1
5077					40,3877	77615 0	DAD	
5078	REP	4	LAST	624	40,3700	02321 0		WWPOS
5079	REP	5	LAST	624	40,3701	02321 0	STORE	WWPOS
5080					40,3702	47573 0	VLOAD*	VSQ
5081	REP	56	LAST	624	40,3703	02533 0		W +90D,1
5082					40,3704	77615 0	DAD	
5083	REP	4	LAST	624	40,3705	02323 1		WWVEL
5084	REP	5	LAST	624	40,3706	02323 1	STORE	WWVEL
5085					40,3707	75500 0	TIX,1	SORT
5086	REP	1			40,3710	61675 1		MXPOSVEL
5087	REP	6	LAST	624	40,3711	16323 1	STOOL	WWVEL
5088	REP	6	LAST	624	40,3712	02321 0		WWPOS
5089					40,3713	77766 0	SORT	
5090	REP	7	LAST	624	40,3714	02321 0	STORE	WWPOS
5091					40,3715	52000 0	BOV	GOTO
5092					40,3716	61720 0		+2
5093	REP	1			40,3717	61724 1		V67XXX
5094					40,3720	77745 1	DLOAD	
5095	REP	9	LAST	616	40,3721	15340 1		DPPOS*AX
5096	REP	8	LAST	624	40,3722	02321 0	STORE	WWPOS
5097	REP	7	LAST	624	40,3723	02323 1	STORE	WWVEL
5098					40,3724	66150 0	LXA,1	
5099	REP	9	LAST	624	40,3725	00051 0		S2
5100	REP	12	LAST	557	40,3726	00052 0		OPRET
5101					40,3727	77776 1	EXIT	
5102	REP	39	LAST	578	40,3730	0 4574 0	TC	POSTJUMP
5103	REP	2	LAST	259	40,3731	27406 0	CADR	INTWAKE
5104	REP	11	LAST	496	E4,1720		=	RANGE
5105	REP	7	LAST	497	E4,1722		=	RRATE
5106	REP	12	LAST	497	E4,1724		=	RTHETA



ASSEMBLE REVISION 249 OF AOC PROGRAM COLOSSUS BY NASA 2021111-041

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L P20-P25

USER#S PAGE NO. 74 ES 34

5107	40,3732	01543 1	V06N99A VN	0699
5108	40,3733	22383 1	1/SORT3 ZDEC	0.5773502
5108	40,3734	11620 0		
5109	40,3735	00002 0	V67DEC2 ZDEC	2 B-14
5109	40,3738	00000 1		

L P30,P37

USER'S PAGE NO. 1 E0 54

0001				32,2017			BANK 32
0002	REF	1		35,2000			SETLOC P30S1
0003				35,3544			BANK
0004	REF	8	LAST	555	E7,1625		EBANK= MGA
0005	REF	1					COUNT 35/P34
0006				35,3544	77420 1	DISPMGA	STQ EXIT
0007	REF	2	LAST	90	35,3545	02370 1	
0008	REF	2	LAST	473	35,3546	0 3564 0	TC RCEXIT
0009	REF	2	LAST	473	35,3547	3 3132 1	DISP45 CAP V16N45
0010	REF	155	LAST	623	35,3550	0 4555 0	TC BANKCALL
0011	REF	11	LAST	617	35,3551	20763 1	CADR GOF LASHR
0012	REF	33	LAST	617	35,3552	0 4106 1	TC GOTOPOOH
0013	REF	1			35,3553	0 3560 1	TC END45
0014	REF	1			35,3554	0 3547 1	TC DISP45
0015	REF	39	LAST	617	35,3555	0 5301 0	P30PHSI TC PHASCHNG
0016					35,3556	00014 1	OCT 14
0017	REF	78	LAST	617	35,3557	0 5112 0	TCR ENDORJOB
0018	REF	126	LAST	623	35,3560	0 6006 1	END45 TC INTPRET
0019					35,3561	52014 0	CLEAR GOTO
0020	REF	1			35,3562	03664 0	TIMRFLAG
0021	REF	3	LAST	626	35,3563	02370 1	RCEXIT
0022					35,3564	0 0006 1	COMPTGO EXTEND
00221	REF	1			35,3565	23=066 0	QXCH PHSPROT6
00222	REF	32	LAST	623	35,3566	0 5435 0	TC UPFLAG
00223	REF	2	LAST	626	35,3567	00155 0	ADRES TIMRFLAG
00224	REF	125	LAST	586	35,3570	3 4714 1	CAP ZERO
00225	REF	1			35,3571	55=145 1	TS NVWORD1
00226					35,3572	0 0004 0	INHINT
00227	REF	74	LAST	608	35,3573	3 4712 1	CAP ONE
00228	REF	22	LAST	530	35,3574	0 5140 1	TC WAITLIST
00229	REF	27	LAST	522	E7,1412		EBANK= TIG
0023	REF	3	LAST	213	35,3575	03172 0	2CADR CLKTASK
0023					35,3576	50067 0	
00231	REF	11	LAST	610	35,3577	0 5261 1	TC 2PHSCHNG
00232					35,3600	40036 0	OCT 40036
00233					35,3601	05024 1	OCT 05024
00234					35,3602	13000 0	OCT 13000
00235	REF	2	LAST	626	35,3603	0 1066 0	TC PHSPROT6

USED IN P30

USED TO COMPUTE TTGO
** GROUP 6 TEMPORARY USED , , BEWARE **

SET TIMRFLAG
BIT 11 FLAG 7

6.3SPOT FOR CLKTASK
GROUP 4 CONTINUES HERE

L P30,P37

USER'S PAGE NO. 2 E7 S3

P00239 PROGRAM DESCRIPTION P30 DATE 3-6-67

R00245 MOD.I BY S. ZELDIN- TO ADD P31 AND AD APT P30 FOR P31 USE. 22DEC67

R0025 FUNCTIONAL DESCRIPTION

R0026 +30(EXTERNAL DELTA-V TARGETTING PROGRAM)

R0027 ACCEPTS ASTRONAUT INPUTS OF TIG,DELV(LV) AND COMPUTES, FOR DISPLAY,

R0028 APOGEE, PERIGEE, DELV(MAG), MGA ASSOCIATED WITH DESIRED MANEUVER

R0029 P31(GENERAL LAMBERT AIMPOINT GUIDANCE)

R00291 A GROUND RULE FOR P31 IS THE ANGLE BETWEEN THE TARGET VECTOR AND

R00292 POSITION VECTOR AT TIG IS NOT 165-195 DEGREES APART

R0030 BASED ON STORED INPUT OF OFFSET TARGET(B+29) AND DELTA T TRANS, AND

R0031 ASTRONAUT ENTRY OF TIG, P31 COMPUTES REQUIRED VELOCITY FOR MANEUVER

R0032 AND, FOR DISPLAY, APOGEE, PERIGEE, DELV(TAG), MGA ASSOCIATED WITH

R0033 DESIRED MANEUVER

R0034 THE FOLLOWING SUBROUTINES ARE USED IN P30 AND P31

R0035 S30.1 (P30 ONLY)

R0036 S31.1 (P31 ONLY)

R0037 P30/P31 - DISPLAYS TIG

R0038 CNTUP30 - DISPLAYS DELV(LV)

R00361 PARAM30 - DISPLAYS APOGEE, PERIGEE, DELV(MAG), MGA, TIME FROM TIG,

R00362 MARKS SINCE LAST THRUSTING MANEUVER

R00363 CALLING SEQUENCE VIA JOB FROM V37

R00364 EXIT VIA V37 CALL OR GOTOP00H

R00365 OUTPUT FOR POWERED FLIGHT

R00366 VTIG X

R00367 RTIG XSEE S30.1

R00368 DELVSIN X

R00369 VCDISP

R003691 RTARG X

R003692 TPASS4 X SEE S31.1

R003693 X

0039 REF 1

COUNT 35/P30

003901 REF 1 35,3604 0 3636 1 P30

003903 REF 1 35,3605 0 3655 1

003905 REF 35 LAST 612 35,3606 0 5447 0

003907 REF 15 LAST 576 35,3607 00027 1

003909 REF 127 LAST 626 35,3610 0 6006 1

003911 35,3611 77624 1

003913 REF 1 35,3612 63102 1

003915 35,3613 77776 1

003919 REF 1 35,3614 0 3665 1

003921 REF 33 LAST 626 35,3615 0 5435 0

TC P30/P31

TC CNTUP30

TC DOWNFLAG

ADRES UPDATFLAG

TC INTPRET

CALL

S30.1

EXIT

TC PARAM30

TC UPFLAG

RESET UPDATFLAG
BIT 7 FLAG 1

L P30, P37

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SET XDELVFLG BIT 6 FLAG 2

RESET UPDATFLG BIT 7 FLAG 1

RESET NORMSW BIT 10 FLAG 7

BIT 6 FLAG 2

SET UPDATFLG BIT 7 FLAG 1

SET TRACKFLG BIT 5 FLAG 1
T OF IGN

ON TERMINATION GOTOPOOH
ON PROCEED GO DO REPTST

003923	REP	3	LAST	520	35,3616	00045 0		ADRES	XDELVFLG
003925	REP	34	LAST	626	35,3617	1 4106 0		TCP	GOTOPOOH
003927	REP	2	LAST	627	35,3620	0 3636 1	P31	TC	P30/P31
003929	REP	36	LAST	627	35,3621	0 5447 0		TC	DOWNFLAG
003931	REP	16	LAST	627	35,3622	00027 1		ADRES	UPDATFLG
003932	REP	37	LAST	628	35,3623	0 5447 0		TC	DOWNFLAG
003933	REP	3	LAST	480	35,3624	00156 0		ADRES	NORMSW
003934	REP	126	LAST	627	35,3625	0 6006 1		TC	INTPRET
003935					35,3626	77624 1		CALL	
003937	REP	1			35,3627	63154 1			S31.1
003939					35,3630	77776 1		EXIT	
003943	REP	2	LAST	627	35,3631	0 3655 1		TC	CNTNUP30
003945	REP	2	LAST	627	35,3632	0 3665 1		TC	PARAM30
003947	REP	36	LAST	626	35,3633	0 5447 0		TC	DOWNFLAG
003949	REP	4	LAST	628	35,3634	00045 0		ADRES	XDELVFLG
003951	REP	35	LAST	626	35,3635	1 4106 0		TCP	GOTOPOOH
00396	REP	152	LAST	476	35,3636	56 002 0	P30/P31	XCH	0
00397	REP	1			35,3637	55=664 0		TS	P30/31RT
0040	REP	34	LAST	627	35,3640	0 5435 0		TC	UPFLAG
00405	REP	17	LAST	626	35,3641	00027 1		ADRES	UPDATFLG
0041	REP	35	LAST	628	35,3642	0 5435 0		TC	UPFLAG
00415	REP	5	LAST	576	35,3643	00031 0		ADRES	TRACKFLG
0042	REP	1			35,3644	3 3722 0		CAP	V06N33
0043	REP	156	LAST	626	35,3645	0 4555 0		TC	BANKCALL
0044	REP	12	LAST	626	35,3646	20763 1		CADR	GOFLASH
0045	REP	36	LAST	628	35,3647	1 4106 0		TCP	GOTOPOOH
00467	REP	2	LAST	628	35,3650	0 1664 1		TC	P30/31RT
0047	REP	3	LAST	628	35,3651	1 3642 0		TCP	P30/P31 +4
0048	REP	40	LAST	628	35,3652	0 5301 0		TC	PHASCHNG
0049					35,3653	00014 1		OCT	00014
0050	REP	79	LAST	626	35,3654	0 5112 0		TC	ENDOFJOB
00501	REP	153	LAST	628	35,3655	56 002 0	CNTNUP30	XCH	0
00502	REP	1			35,3656	55=127 0		TS	P30/RET
0051	REP	2	LAST	472	35,3657	3 3131 1		CAP	V06N81
0052	REP	157	LAST	628	35,3660	0 4555 0		TC	BANKCALL
0053	REP	25	LAST	613	35,3661	20624 0		CADR	GOFLASH
0054	REP	37	LAST	626	35,3662	1 4106 0		TCP	GOTOPOOH
0055	REP	2	LAST	626	35,3663	0 1127 1		TC	P30/RET
0056	REP	3	LAST	628	35,3664	1 3657 1		TCP	CNTNUP30 +2
0067	REP	154	LAST	628	35,3665	56 002 0	PARAM30	XCH	0
00675	REP	3	LAST	626	35,3666	55=664 0		TS	P30/31RT
0068	REP	1			35,3667	3 3723 1		CAP	V06N42
0069	REP	158	LAST	626	35,3670	0 4555 0		TC	BANKCALL
0070	REP	26	LAST	626	35,3671	20624 0		CADR	GOFLASH
0071	REP	36	LAST	626	35,3672	0 4106 1		TC	GOTOPOOH
0072	REP	1			35,3673	1 3675 1		TCP	REPTST

L P30,P37

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0073	REF	3	LAST	628	35,3674	1 3667 1	TCF	PARAM30 +2
0074	REF	19	LAST	554	35,3675	3 4676 1	REPTTEST	CAP BIT13
0075	REF	36	LAST	578	35,3676	7 0077 0	MASK	STATE +3
0076					35,3677	0 0006 1	EXTEND	
0077	REF	1			35,3700	1 3710 0	BZF	NOTSET
0078	REF	129	LAST	628	35,3701	0 6006 1	TC	INTPRET
0079					35,3702	41575 0	VLOAD	PUSH
0080	REF	6	LAST	520	35,3703	03646 0		DELVSIN
0081					35,3704	77624 1	CALL	
0082	REF	3	LAST	485	35,3705	10660 0		GET+MGA
0084					35,3706	77650 1	GOTO	
0085	REF	1			35,3707	73714 1		FLASHMGA
0086					35,3710	0 0006 1	NOTSET	EXTEND
0087	REF	1			35,3711	4 3721 1	DCS	MARSDP
0088	REF	9	LAST	626	35,3712	53=626 0	DXCH	+MGA
0089	REF	130	LAST	629	35,3713	0 6006 1	TC	INTPRET
0090					35,3714	77624 1	FLASHMGA	CALL
0091	REF	1			35,3715	73544 0		DISPMGA
0092					35,3716	77776 1	EXIT	
00935	REF	4	LAST	628	35,3717	0 1664 1	TC	P30/31RT
0097					35,3720	00000 1	MARSDP	OCT 00000
0098					35,3721	35100 0		OCT 35100
A0099								
0100					35,3722	01441 1	V06N33	VN 0633
0102					35,3723	01452 0	V06N42	VN 0642
0103					35,3724	04043 1	V16N35	VN 1635
0104					35,3725	01455 1	V06N45	VN 0645

REFSMFLAG

REFSMFLAG =0 , THEN BRANCH TO NOTSET

+MGA, +MGA+1 CONTAINS (-00001)

(00000) (16440) = (+00001)

(.01) DEGREES IN THE LOW ORDER REGISTE

L P30,P37

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P0105 PROGRAM DESCRIPTION S30.1 DATE 9NOV66

R0108 MOD NO 1 LOG SECTION P30,P37
R0107 MOD BY RAMA AIYAWAR **
R01075 MOD.2 BY S.ZELDIN - TO CORRECT MOD.1 FOR COLOSSUS 29DEC67
R0106 FUNCTIONAL DESCRIPTION
R0109 BASED ON STORED TARGET PARAMETERS(R OF IGNITION(RTIG),V OF
R0110 IGNITION(VTIG),TIME OF IGNITION(TIG),DELV(LV),COMPUTE PERIGEE ALTITUDE
R0111 APOGEE ALTITUDE AND DELTA-V REQUIRED IN REF. COORDS.(DELVSIN)
R0112 CALLING SEQUENCE
R0113 L CALL
R0114 L+1 S30.1
R0115 NORMAL EXIT MODE
R0116 AT L+2 OR CALLING SEQUENCE (GOTO L+2)
R0117 SUBROUTINES CALLED
R0118 THISPREC
R0119 PERIAP0
R0120 ALARM OR ABORT EXIT MODES
R0121 NONE
R0122 ERASABLE INITIALIZATION REQUIRED
R0123 TIG TIME OF IGNITION DP B26CS
R0124 DELVSLV SPECIFIED DELTA-V IN LOCAL VERT.
R0125 COORDS. OF ACTIVE VEHICLE AT
R0126 TIME OF IGNITION VCT. B+7M/CS
R0127 OUTPUT
R0128 RTIG POSITION AT TIG VCT. B+29M
R0129 VTIG VELOCITY AT TIG VCT. B+7M
R0130 HAP0 APOGEE ALT. DP B+29M
R0131 HPER PERIGEE ALT. DP B+29M
R0132 DELVSIN DELVSLV IN REF COORDS VCT. B+7M/CS
R0133 VDISP MAG. OF DELVSIN DP B+7M/CS
R0138 DEBRIS QTEMP TEMP. ERASABLE
R0137 QPRET,MPAC
R0138 PUSHLIST

0139 REF 1 31,2000 SETLOC P30S1A
0140 31,3102 BANK

0141 REF 1 COUNT 35/S30S

0142 31,3102 71220 1 S30.1 STQ DLOAD
0143 REF 4 LAST 546 31,3103 03857 0 QTEMP
0144 REF 28 LAST 628 31,3104 03413 1 TIG
0145 REF 32 LAST 596 31,3105 34041 0 STCALL TDEC1
0146 REF 5 LAST 506 31,3106 27022 1 THISPREC

TIME IGNITION SCALED AT 2(+26)CS

ENCKE ROUTINE FOR

0147 31,3107 67175 0 VLOAD SXA,2
0146 REF 16 LAST 566 31,3110 00007 0 VATT
01465 REF 11 LAST 526 31,3111 03746 1 RTX2
0149 REF 2 LAST 121 31,3112 27640 0 STOVL VTIG

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0150	REF	20	LAST	586	31,3113	00001 0
0151	REF	3	LAST	121	31,3114	03632 0
0152	REF	25	LAST	547	31,3115	03540 0
0153					31,3116	53435 0
0154	REF	3	LAST	630	31,3117	03640 0
0155	REF	9	LAST	471	31,3120	36817 1
0156	REF	3	LAST	469	31,3121	72667 0
0157					31,3122	61375 1
0158	REF	4	LAST	171	31,3123	03405 0
0159					31,3124	00001 0
0160					31,3125	68172 0
0161	REF	9	LAST	545	31,3126	03745 1
0162	REF	7	LAST	629	31,3127	03646 0
0163					31,3130	77648 0
0164	REF	4	LAST	276	31,3131	27654 0
0165	REF	4	LAST	631	31,3132	03632 0
0166					31,3133	53315 0
0167	REF	8	LAST	631	31,3134	03646 0
0168	REF	4	LAST	631	31,3135	03640 0
0169					31,3136	77624 1
0170	REF	3	LAST	520	31,3137	45312 0
0171					31,3140	77624 1
0172	REF	3	LAST	520	31,3141	45422 1
01725					31,3142	77624 1
01726	REF	3	LAST	513	31,3143	46754 0
0173	REF	2	LAST	274	31,3144	16368 0
0174					31,3145	00005 1
0175					31,3146	77624 1
0176	REF	4	LAST	631	31,3147	45422 1
01765					31,3150	77624 1
01766	REF	4	LAST	631	31,3151	46754 0
0177	REF	4	LAST	274	31,3152	36364 0
0178	REF	5	LAST	630	31,3153	03657 0

	RATT	
STORE	RTIG	
STORE	RACT3	
VXV	UNIT	
	VTIG	
STCALL	UNRM	
	LOMAT	
VLOAD	VXM	
	DELVSIV	
	0	
VSL1	SXA,1	
	RTX1	
STORE	DELVSIN	
ARVAL		
STOVL	VGDISP	MAG DELV
	RTIG	
POML	VAD	
	DELVSIN	
	VTIG	
CALL		
	PERIAPO1	
CALL		
	SHIPTR1	
CALL		
	MAXCHK	
STODL	HPER	PERIGEE ALT B+29
	4D	
CALL		
	SHIPTR1	
CALL		
	MAXCHK	
STCALL	HAPO	APOGEE ALT B+29
	OTEMP	



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R0181 S31.1 PROGRAM DESCRIPTION
R0182 MOD.1 BY S.ZELDIN

28DEC67

R0183 S31.1 COMPUTES DELV IN REF AND LV COORDS,MAG OF DELV,INTERCEPT TIME,
R0184 APOGEE AND PERIGEE ALT FOR REQUIRED MANEUVERR0185 CALLING SEQUENCE
R0186 L CALL
R0187 L +1 S31.1R0188 NORMAL EXIT MODE
R0189 AT L +2 OF CALLING SEQUENCE(GOTO L+2)

R0190 SUBROUTINES CALLED

R0191 AGAIN

R0192 PERIAPO1

R0193 SHIPTR1

R0194 MIDGIM

R0195 NO ALARM OR ABORT MODES

R0196 INPUT

R0197 DELTA DP +28

R0198 TIG DP +28

R0199 RTARG VCT +29

R0200 OUTPUT

R0201 DELVLVC VCT +7

R0202 VDISP DP +7

R0203 HAPO DP +29

R0204 HPER DP +29

R0205 TPASS4 DP +26

R0206 DEBRIS - QTEMP

0200 31,3154 71220 1 S31.1

0201 REF 6 LAST 631 31,3155 03657 0

0202 REF 29 LAST 630 31,3158 03413 1

0203 REF 33 LAST 830 31,3157 34041 0

0204 REF 1 31,3160 61663 0

0205 31,3161 63375 0

0206 REF 5 LAST 831 31,3162 03832 0

0207 REF 12 LAST 547 31,3163 03612 1

0208 31,3164 77824 1

0209 REF 4 LAST 631 31,3165 45312 0

0210 31,3188 77824 1

0211 REF 5 LAST 631 31,3167 45422 1

02115 31,3170 77824 1

02118 REF 5 LAST 631 31,3171 48754 0

0212 REF 3 LAST 631 31,3172 16388 0

0213 31,3173 00005 1

0214 31,3174 77824 1

0215 REF 6 LAST 632 31,3175 45422 1

02155 31,3176 77824 1

02156 REF 6 LAST 632 31,3177 48754 0

0218 REF 5 LAST 631 31,3200 28364 1

STO DLOAD

QTEMP

TIG

STCALL TDEC1

VLOAD PDVL

RTIG

VIPRIME

CALL

PERIAPO1

CALL

SHIPTR1

CALL

MAXCHK

STOVL HPER

4D

CALL

SHIPTR1

CALL

MAXCHK

STOVL HAPO

RETURNS RIX2,RIX1,RATT,VATT,VIPRIME
DELUSET3

B29

B29

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0217	REP	15	LAST	545	31,3201	03646 0
02175					31,3202	00001 0
0218					31,3203	45014 0
0219	REP	6	LAST	544	31,3204	01072 0
0220	REP	1			31,3205	10853 0
0221					31,3206	77846 0
0222	REP	5	LAST	631	31,3207	17854 0
0223	REP	8	LAST	545	31,3210	03423 1
0224					31,3211	77815 0
0225	REP	30	LAST	632	31,3212	03413 1
0226	REP	8	LAST	489	31,3213	37858 0
0227	REP	7	LAST	632	31,3214	03857 0

DELVEET3
STORE 0
SET CALL
AVFLAG
MIDGIM
ABVAL
STOOL VGDISP
DELT4
DAD
TIG
STCALL TPASS4
QTEMP

GET DELVLVC B7 FORDISPLAY

B+7 FOR DISPLAY

FOR S40.1

L P30,P37

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P0327 SUBROUTINE NAME' DELRSPL

(CONTINUATION OF V 82 IN CS4 IF P11 ACTI

R0329 TRANSFERRED COMPLETELY FROM SUNDISK, P30S REV 33. 9 SEPT 67.

R0330 MOD NO' 0 MOD BY' ZELDIN DATE' 11 APR 67

R0331 MOD NO' 1 MOD BY' RR BAINSPATHER DATE' 12 MAY 67

R0332 MOD NO' 2 MOD BY' RR BAINSPATHER DATE' 5 JULY 67

R0333 MOD NO' 2.1 MOD BY' RR BAINSPATHER DATE' 12 JUL 67

R0336 MOD NO' 3 MOD BY' S.ZELDIN DATE' 3 APRIL 68

R0337 MOD 4 MOD BY' S.ZELDIN DATE' 3 APRIL 68

R0338 FUNCTION' CALCULATE (FOR DISPLAY ON CALL) AN APPROXIMATE

R0340 ERROR. IF THE FREE-FALL TRANSFER ANGLE TO 300K FT ABOVE PAD RADIUS IS POSITIVE'

R0342 SPLASH ERROR= -RANGE TO TARGET + FREE-FALL TRANSFER ANGLE + ESTIMATED ENTRY ANGLE.

R0344 THE TARGET LOCATION AT ESTIMATED TIME OF IMPACT IS USED. IF THE FREE-FALL TRANSFER

R0346 ANGLE IS NEGATIVE' SPLASH ERROR= -RANGE TO TARGET

R0347 THE PRESENT TARGET LOCATION IS USED.

R0348 CALLING SEQUENCE CALLED AFTER SR30.1 IF IN CS4 AND IF P11 OPERATING (UNDER CONTROL OF V62)

R0349 SUBROUTINES CALLED' VGAMCALC, TFF/TRIG, LALOTRV.

R0350 EXIT RETURN DIRECTLY TO V 82 PROG. AT SPLRET

R0351 ERASABLE INITIALIZATION LEFT BY SR30.1 AND V82GQN1

R0352 OUTPUT' RSP-RREC RANGE IN REVOLUTIONS

R0354 DEBRIS' OPRET, POLO ...POL7 ,POL10

ADD UR,RT CALC WHEN BELOW 300K FT

FIX ERROR IN MOD. 2.

CHANGE SIGN OF DISPLAYED ERROR.

CHANGE EQUATIONS FOR L/D=.18 WHICH REPLA

MEASURE OF IN-PLANE SPLASH DOWN

MEASURE OF IN-PLANE SPLASH DOWN

MEASURE OF IN-PLANE SPLASH DOWN

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MEASURE OF IN-PLANE SPLASH DOWN

R03541 THETA(1)

R0355

0356 32,2017 BANK 32

0357 REF 1 32,2000 SETLOC DELRSPL1

0358 32,2017 BANK

0359 REF 1 COUNT* 55/P30

PROGRAMS' P30 EXTERNAL DELTA V

0360 32,2017 00011 1 DELRSPL STORE 8D

0361 32,2020 45244 1 BPL DSU

0362 REF 1 32,2021 64067 1 CANTDO

0363 REF 1 32,2022 16326 1 1BITDP

0364 32,2023 45000 0 BOV CALL

0365 REF 2 LAST 634 32,2024 64067 1 CANTDO

0366 REF 1 32,2025 55050 1 VGAMCALC

0367 32,2026 45006 0 PUSH CALL

0368 REF 1 32,2027 56573 0 TFF/TRIG

0369 32,2030 77624 1 CALL

0370 REF 1 32,2031 64075 1 AUGKUGL

0371 32,2032 65525 0 ACOS

0372 REF 1 32,2033 00017 1 CDELF/2

0373 32,2034 77615 0 DAD

0374 32,2035 00005 1

0375 REF 2 LAST 69 32,2036 28350 0 GETARG

0376 REF 7 LAST 434 32,2037 03401 1 STOVL THETA(1)

0377 REF 9 LAST 622 32,2040 15104 0 LAT(SPL)

0378 REF 10 LAST 604 32,2041 15332 1 LAT

0379 REF 6 LAST 601 32,2042 15110 0 HI6ZEROS

0381 REF 5 LAST 500 32,2043 01205 1 STOVL ALT

ALT=0 = LAT +4

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L F30,P37

USER=3 PAGE NO. 10 E7 83

0382 32,2044 71214 0
 0383 REF 2 LAST 499 32,2045 03711 0
 03831 32,2048 64050 0
 03832 REF 6 LAST 509 32,2047 02325 1
 03833 32,2050 43225 0
 03834 32,2051 00011 1
 0384 32,2052 45014 0
 0385 REF 6 LAST 614 32,2053 00662 0
 0386 REF 4 LAST 614 32,2054 26373 1

 0387 32,2055 63258 0
 0388 REF 14 LAST 513 32,2058 02327 0
 03881 32,2057 50258 0
 0389 32,2060 65552 0
 0390 32,2061 77621 1
 A0391
 A0392
 0393 REF 3 LAST 634 32,2062 02350 0
 0394 REF 3 LAST 275 32,2083 36356 1
 03941 REF 1 32,2084 27404 1
 03942 32,2065 77624 1
 0395 REF 1 32,2068 46653 0
 0396 32,2067 65345 0
 A0397
 0398 REF 7 LAST 599 32,2070 15330 0
 0399 REF 11 LAST 634 32,2071 15332 1
 0400 32,2072 77806 1
 0401 32,2073 34011 0
 0402 REF 1 32,2074 64036 0

 0405 32,2075 77775 1
 0406 REF 1 32,2076 24251 1
 0407 REF 25 LAST 621 32,2077 14045 0
 0408 32,2100 00001 0
 0409 32,2101 50025 0
 0410 REF 1 32,2102 24243 1
 0411 REF 1 32,2103 84130 1
 0412 32,2104 65080 1
 0413 REF 19 LAST 824 32,2105 00050 1
 0414 REF 26 LAST 635 32,2106 00048 0
 0415 32,2107 45324 0
 0416 REF 20 LAST 835 32,2110 00050 1
 0417 REF 1 32,2111 24231 1
 0418 32,2112 65040 0
 0419 REF 2 LAST 635 32,2113 64130 1
 0420 REF 21 LAST 635 32,2114 00050 1
 0421 32,2115 50025 0
 0422 REF 1 32,2116 24241 0
 0423 REF 3 LAST 635 32,2117 64130 1
 0424 32,2120 65124 0

BON DLOAD
 V37FLAG
 +2
 TSTARTB2
 DSU DAD
 BD
 CLEAR CALL
 BRADFLAG
 LALOTRW

 UNIT PDVL
 RONE
 UNIT DOT
 SL1 ARCCOS
 BDSU

 DELRONE STCALL
 CALL
 CANTDO DLOAD
 SPLRET
 PDOL
 HIDEHALF
 HI6ZEROS
 PUSH
 STCALL BD
 ORTARG
 AUGCKUGL VLOAD
 X1CON -2
 STODL X1 -2
 0
 DSU RMN
 V(21K)
 LOOPSET
 XSU,1 XCHX,2
 S1
 X1
 XCHX,2 DSU
 S1
 V(3K)
 RMN XCHX,2
 LOOPSET
 S1
 DSU RMN
 V(4K)
 LOOPSET
 XCHX,2 XCHX,2

R RECOV. IN ALPHAV AND MPAC

ERROR = THETA EST - THETA TARG
 NEGATIVE NUMBER SIGNIFIES THAT WILL FALL SHORT.
 POSITIVE NUMBER SIGNIFIES THAT WILL OVERSHOOT.

DOWNRANGE RECOVERY RANGE ERROR /360

INITIALIZE ERASE TO DOT TARGET AND UR
 FOR RANGE ANGLE.
 TO PDL 0 FOR DEN IN DDV.

ZERO TO PDL 2 FOR PHI ENTRY

GO SET RSP-RREC =0

L P30,P37

USER'S PAGE NO. 11 E7 S3

0425	REF	22	LAST	635	32,2121	00050 1					
0426	REF	27	LAST	635	32,2122	00046 0				S1	
0427					32,2123	50025 0				X1	
0428	REF	1			32,2124	24225 1		DSU	BMN		
0429	REF	4	LAST	635	32,2125	64130 1			V(400)		
0430					32,2126	77730 0			LOOPSET		
0431	REF	23	LAST	636	32,2127	00050 1		SCA,1			
0432					32,2130	52110 0	LOOPSET	INCR,1	S1	GOTO	
0433					32,2131	00001 0		DEC	1		
0434	REF	1			32,2132	64135 1				K1K2LOOP	
0435					32,2133	77730 0	K2CALC	SCA,1			
0436	REF	24	LAST	636	32,2134	00050 1					
0437					32,2135	44745 1	K1K2LOOP	DLOAD	S1		
0438					32,2136	00001 0			DSU*		
0439	REF	1			32,2137	24240 1			0		
0440					32,2140	42603 1			V(32K) +1,1		
0441	REF	1			32,2141	24224 0		DMP*	DAD*		
0442	REF	1			32,2142	24210 1			YK1K2 +1,1		
0443					32,2143	60125 1			CK1K2 +1,1		
0444					32,2144	00003 1		PDDL	TX,1		
0445	REF	1			32,2145	64133 1			2		
0446					32,2146	55225 1			K2CALC		
04461					32,2147	50000 1		DSU	BDDV		
04462	REF	1			32,2150	64167 0		BOV	BMN		
04463	REF	2	LAST	636	32,2151	64167 0			MAXPHI		
0447					32,2152	45325 1	PHICALC	PDDL	DSU		
0448					32,2153	00001 0				PHI ENTRY PDL 4D	
0449	REF	1			32,2154	24251 1			0		
0450					32,2155	71244 0			V(28K)		
0451	REF	1			32,2156	64164 0		BPL	DLOAD		
0452	REF	1			32,2157	24245 1			TGR26		
0453					32,2160	77671 1			TESS26		
0454					32,2161	00001 0		DDV			
0455					32,2162	43405 1	TENT	DMP	0		
0456					32,2163	00005 1			RVO		
0457					32,2164	52145 0	TGR26	DLOAD	4D		
0458	REF	1			32,2165	24247 0			GOTO		
0459	REF	1			32,2166	64162 0			TGR26CON		
04591					32,2167	52145 0	MAXPHI	DLOAD	TENT		
04592	REF	1			32,2170	24173 1			GOTO		
04593	REF	1			32,2171	64152 0			MAXPHIC		
04594					32,2172	02755 1	MAXPHIC	2DEC	PHICALC		
04594					32,2173	01307 1			.09259298		
0460	REF	2	LAST	634 TO 636	109	109*		COUNT*	55/P30		

A0461
A0462

BELOW

**** TABLE IS INDEXED. KEEP IN ORDER 666

L P30,P37

USER-S PAGE NO. 12 E7 S3

0463	32,2174	00013 0	2DEC	7.07304528 E-4	5500
0463	32,2175	22852 0			
0464	32,2176	00005 1	2DEC	3.08841975 E-4	2400
0464	32,2177	01842 0			
0465	32,2200	00005 1	2DEC	3.08841975 E-4	2400
0465	32,2201	01842 0			
0468	32,2202	77556 1	2DEC	-8.8888888 E-3	-3.2
0466	32,2203	53522 1			
0467	32,2204	00055 1	2DEC	2.7777777 E-3	1
0467	32,2205	20268 1			
0468	32,2206	00155 0 CK1K2	2DEC	6.8888888 E-3	2.4
0468	32,2207	07202 0			
0469	32,2210	00000 1	2DEC	0	0
0469	32,2211	00000 1			
0470	32,2212	77730 0	2DEC*	-1.88909989 E-5 B7*	-.443
0470	32,2213	71525 0			
0471	32,2214	00000 1	2DEC	0	
0471	32,2215	00000 1			
0472	32,2218	04445 0	2DEC*	1.11839891 E-3 B7*	.001225
0472	32,2217	10102 0			
0473	32,2220	03726 1	2DEC*	9.58911838 E-4 B7*	.00105
0473	32,2221	31201 0			
0474	32,2222	01040 1 YK1K2	2DEC*	2.59733157 E-4 B7*	.000285
0474	32,2223	28313 1			
0475	32,2224	00234 1 V(400)	2DEC	1.2192 B-7	
0475	32,2225	01680 0			
0476	32,2228	25254 0 V(28K)	2DEC	85.344 B-7	
0478	32,2227	01014 0			
0477	32,2230	02222 1 V(3K)	2DEC	9.144 B-7	
0477	32,2231	15848 1			
0478	32,2232	22223 1 V(24K)	2DEC	73.152 B-7	
0478	32,2233	18457 0			
0479	32,2234	25254 0	2DEC	85.344 B-7	
0479	32,2235	01014 0			
0480	32,2236	30304 0 V(32K)	2DEC	97.538 B-7	
0480	32,2237	23351 1			
0481	32,2240	03030 1 V(4K)	2DEC	12.192 B-7	
0481	32,2241	22335 1			
0482	32,2242	20000 0 V(21K)	2DEC	84.000 B-7	
0482	32,2243	00000 1			
0483	32,2244	00033 1 TLESS28	2DEC*	5.70148888 E7 B-35*	8660PHI/V
0483	32,2245	05783 0			
0484	32,2248	00053 1 TGR26CON	2DEC	7.2 E5 B-28	PHI/3
0484	32,2247	36200 0			
0485	32,2250	23637 1 V(26K)	2DEC	79.248 B-7	26000
0485	32,2251	27838 1			
0486	32,2252	00012 1 X1CON	DEC	10	
0487	32,2253	00010 0	DEC	8	
0488	32,2254	00008 1	DEC	6	

A0489

**** TABLE IS INDEXED. KEEP IN ORDER ***



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20'35 OCT. 28, 1988 PANDORA .080 PAGE 638

L P30,P37

USER=3 PAGE NO. 13 E7 S3

A0490

ABOVE

L P30,P37

USER=5 PAGE NO. 14 ET 53

P0491 AVFLAGA/P

R0492 SUBROUTINES USED

R0493 UPFLAG
R0494 DOWNFLAG

0496	REP	2	LAST	626	35,2000	
0497					35,3726	
0498	REP	17	LAST	549	E4,1770	
0499					35,3726	0 0006 1
0500	REP	18	LAST	639	35,3727	23=770 0
0501	REP	39	LAST	628	35,3730	0 5447 0
0502	REP	7	LAST	633	35,3731	00050 1
05025	REP	4	LAST	560	35,3732	3 4753 1
05026	REP	29	LAST	565	35,3733	54 003 0
05027	REP	2	LAST	171	E7,1424	
0503	REP	20	LAST	629	35,3734	3 4676 1
0504	REP	3	LAST	639	35,3735	55=424 0
05045	REP	1			35,3738	3 4700 1
05046	REP	30	LAST	639	35,3737	54 003 0
05047	REP	19	LAST	639	E4,1770	
0505	REP	20	LAST	639	35,3740	0 1770 0
0506					35,3741	0 0006 1
0507	REP	21	LAST	639	35,3742	23=770 0
0508	REP	36	LAST	628	35,3743	0 5435 0
0509	REP	8	LAST	639	35,3744	00050 1
05091	REP	22	LAST	639	35,3745	0 1770 0
0510					35,3746	0 0006 1
0511	REP	23	LAST	639	35,3747	23=770 0
05111	REP	37	LAST	639	35,3750	0 5435 0
05112	REP	6	LAST	628	35,3751	00031 0
05113	REP	38	LAST	639	35,3752	0 5435 0
05114	REP	18	LAST	628	35,3753	00027 1
0512	REP	24	LAST	639	35,3754	0 1770 0

SETLOC P30S1
BANK
EBANK= SUBEXIT
EXTEND
QXCH SUBEXIT
TC DOWNFLAG
ADRES AVFLAG
CAP EBANK7
TS EBANK
EBANK= ECSTEER
CAP BIT13
TS ECSTEER
CAP EBANK4
TS EBANK
EBANK= SUBEXIT
TC SUBEXIT
EXTEND
QXCH SUBEXIT
TC UPFLAG
ADRES AVFLAG
TC SUBEXIT
P20FLGON EXTEND
QXCH SUBEXIT
TC UPFLAG
ADRES TRACKFLO
TC UPFLAG
ADRES UPDATFLG
TC SUBEXIT

AVFLAG = CSM

BIT 5 FLAG 2

SET ECSTEER = 1

AVFLAG = IEM

BIT 5 FLAG 2



L P40-P47

R1000 PROGRAM DESCRIPTION **P40CSM**

1129 REP 14 LAST 274 E6,1466
1130 31,3215
1131 REP 1 24,2000
1132 24,2002

EBANK= DAPDATR1
BANK 31
SETLOC P40S
BANK

1133 REP 1

COUNT 24/P40

1134 REP 40 LAST 639 24,2002 0 5447 0 P40CSM

TC DOWNFLAG

1135 REP 1 24,2003 00023 0

ADRES ENG2FLAG

1136 REP 131 LAST 629 24,2004 0 6006 1

TC INTPRET

1137 24,2005 43135 1

SLOAD BOFF

1138 REP 4 LAST 639 24,2006 03425 1

ECSTEER

1139 REP 5 LAST 628 24,2007 01347 0

XDELVPLG

1140 REP 1 24,2010 50013 0

P40S/C

1141 24,2011 77745 1

DLOAD HI6ZEROS

1142 REP 12 LAST 635 24,2012 15332 1

STODL CSTEER

1143 REP 3 LAST 167 24,2013 17703 0

P40S/F

1144 REP 1 24,2014 10335 0

STODL FENG

1145 REP 2 LAST 122 24,2015 17727 0

TIG

1146 REP 31 LAST 672 24,2016 03413 1

STORE NOMTIG

1147 REP 2 LAST 115 24,2017 03450 0

IS THIS AN EXTERNAL DELTA V BURN

NO CSTEER = ECSTEER

YES CSTEER = ZERO

SET UP THRUST FOR P40 20,000 LBS

P41 ENTERS HERE

ORIGINAL TIG MAY BE SLIPPED BY P40S/SV
SET ORIGINAL TIME OF IGNITION FOR S40.9

1148 24,2020 77776 1

EXIT

1149 REP 159 LAST 628 24,2021 0 4555 0

TC BANKCALL

1150 REP 4 LAST 606 24,2022 17573 0

CADR R02BOTH

IMU STATUS CHECK

1151 REP 132 LAST 640 24,2023 0 6006 1

P40PVA TC INTPRET

1152 24,2024 77624 1

CALL

1153 REP 1 24,2025 34000 0

CALL S40.1

COMPUTE VGTIG,UT

1154 24,2026 77624 1

CALL

COMPUTE PREFERRED ATTITUDE

1155 REP 1 24,2027 51512 0

SET

1156 24,2030 77414 0

SET S40.2,3

1157 REP 1 24,2031 01073 1

EXIT

1158 REP 2 LAST 199 24,2032 0 2212 1

P40SXTY TCR SETMINDS -1

NARROW DEADBRAND FOR MANEUVER (EBANK6)

1159 24,2033 0 0003 1

RELINT

1160 REP 160 LAST 640 24,2034 0 4555 0

TC BANKCALL

1161 REP 5 LAST 613 24,2035 58000 1

CADR R80CSM

ATTITUDE MANEUVER

1162 REP 75 LAST 626 24,2036 4 4712 0

CS ONE

FOR UPDATEVG

1163 REP 2 LAST 105 24,2037 55746 1

TS NBRCYCLS

1164 REP 39 LAST 639 24,2040 0 5435 0

TC UPFLAG

1165 REP 3 LAST 626 24,2041 00155 0

ADRES TIMRFLAG

ALLOW CLOCTASK

1166 REP 1 24,2042 0 2252 0

TC P41/P40

1167 REP 1 24,2043 0 2267 0

TC P41/DSP

P41

1168 REP 1 24,2044 3 2351 1

P40TTOG CAP V06N40

INITIALIZE FOR CLOCTASK WHICH IS CALLED



L P40-P47

USER=3 PAGE NO. 2 E6 S3

1169 REP 2 LAST 626 24,2045 55=145 1
1170 REP 133 LAST 640 24,2046 0 6006 1
1171 24,2047 51575 1
1172 REP 5 LAST 169 24,2050 03721 0
1173 REP 6 LAST 633 24,2051 17654 0
11731 REP 13 LAST 640 24,2052 15332 1
11732 REP 4 LAST 276 24,2053 03426 1
1174 24,2054 77776 1

TS NVWORD1
TC INTERPRET
VLOAD ABVAL
VGIG
STOOL VGDISP
HI6ZEROS
STORE DVTOTAL
EXIT

BELOW

FOR R2

1175 24,2055 0 0006 1
1176 REP 1 24,2056 3 2773 0
1177 REP 3 LAST 77 24,2057 53=223 1

EXTEND
DCA STEERADS
DXCH AVEEXIT

SET FOR UPDATEVG AND TEST FOR STEERING
AFTER AVERAGE G

(4.1 PROTECTION)

1176 REP 1 24,2060 3 2344 0
1179 REP 161 LAST 640 24,2061 0 4555 0
1180 REP 2 LAST 612 24,2062 20751 0
1181 REP 1 24,2063 1 2204 1
1182 REP 1 24,2064 1 2362 0
1183 REP 36 LAST 575 24,2065 4 4712 0
1184 REP 1 24,2066 55=445 1

P40GMB CAP P40CLS2
TC BANKCALL
CADR GOPERP1
TCP POST41
TCP TST,TRIM
TRIMONLY CS BIT1
+1 TS MKRTRMP

V34
V33
SET MKRTRMP FOR GIMBAL TRIM (-1)
ENTRY FROM TST,TRIM

1185 REP 126 LAST 626 24,2067 3 4714 1
1186 REP 1 24,2070 55=447 0
A1167

CAP ZERO
TS CNTR

SET CNTR +0 FOR RESTART LOGIC IN S40.6
+0 SAYS NORMAL ENTRY.
+1 (PRE40.6) SAYS RESTART ENTRY

1186 REP 76 LAST 640 24,2071 3 4712 1
1189 REP 23 LAST 626 24,2072 0 5140 1
1190 REP 15 LAST 640 P6,1466
1191 REP 1 24,2073 02051 1
1191 REP 1 24,2074 40066 0
1192 REP 2 LAST 641 24,2075 11=445 1
1193 REP 1 24,2076 3 2343 1
1194 24,2077 1 2101 1
1195 REP 1 24,2100 3 2776 0
1196 REP 162 LAST 641 24,2101 0 4555 0
1197 REP 6 LAST 576 24,2102 01732 0
1198 REP 12 LAST 626 24,2103 0 5261 1
1199 24,2104 40026 1
1200 24,2105 00234 1
1201 REP 77 LAST 641 24,2106 3 4712 1
1202 REP 24 LAST 641 24,2107 0 5140 1
1203 REP 32 LAST 640 E7,1412
1204 REP 4 LAST 626 24,2110 03172 0
1204 24,2111 50067 0

CAP ONE
TC WAITLIST
EBANK= DAPDATR1
ZCADR S40.6

CCS MKRTRMP
CAP 16SEC
TCP +2
CAP 5SEC
TC BANKCALL
CADR DELAYJOB
TC 2PHSCHNG
OCT 40026
OCT 00234
CAP ONE
TC WAITLIST
EBANK= TIG
ZCADR CLOKTASK

TEST TO FIND TIME TO WAIT FOR GIMBALTEST
PLUS, DELAY FOR 16 SECONDS
HOLE
DELAY FOR TRIM ONLY TASK

6.2 = PRE40.6(-0CS), CLOKTASK(100CS)
4.23 = P40S/SV (PRIO12)

P41/SDP

1205 24,2112 0 0003 1
1206 REP 1 24,2113 0 3304 0
1207 REP 33 LAST 641 E7,1412

RELINT
P40S/SV TCR E7SETTER
EBANK= TIG

JOB, 4.23 PROTECTS, PRIO12

L P40-P47

1208	REF	134	LAST	641	24,2114	0 6006 1	
1209					24,2115	45345 1	
1210	REF	34	LAST	641	24,2116	03413 1	
1211	REF	1			24,2117	10342 0	
1212	REF	34	LAST	632	24,2120	00041 1	
1213					24,2121	77624 1	
1214	REF	1			24,2122	27577 1	
1215					24,2123	1 2125 1	
1216	REF	1			24,2124	0 2146 0	
1217					24,2125	0 0006 1	P40SET
1218	REF	266	LAST	623	24,2126	3 0155 0	
1219	REF	9	LAST	210	24,2127	53=673 0	
1223					24,2130	0 0006 1	
1224	REF	1			24,2131	4 2776 1	
1225	REF	10	LAST	642	24,2132	21=673 0	
1226					24,2133	0 0006 1	
1227	REF	11	LAST	642	24,2134	3 1673 1	
1228	REF	2	LAST	417	24,2135	0 5231 1	
1229	REF	35	LAST	642	E7,1412		
1230	REF	3	LAST	209	24,2136	02364 1	
1231	REF	41	LAST	628	24,2137	50067 0	
1232					24,2140	0 5301 0	
					24,2141	20214 1	
1233	REF	60	LAST	626	24,2142	1 5112 1	
1234	REF	163	LAST	641	24,2143	0 4555 0	P40BLNKR
1235	REF	4	LAST	527	24,2144	20607 1	
1236	REF	61	LAST	642	24,2145	1 5112 1	
12362	REF	36	LAST	642	E7,1412		
1237					24,2146	0 0006 1	P40SNEW
1238	REF	5	LAST	301	24,2147	3 1246 0	
1239	REF	37	LAST	642	24,2150	53=413 1	
1240					24,2151	0 0006 1	
1241	REF	2	LAST	642	24,2152	3 2342 0	
1242	REF	38	LAST	642	24,2153	21=413 1	
1243	REF	1			24,2154	1 2125 1	
1244	REF	16	LAST	641	E8,1466		
1245	REF	1			24,2155	3 2353 0	POSTBURN
1246	REF	164	LAST	642	24,2156	0 4555 0	
1247	REF	1			24,2157	20610 1	
1248	REF	2	LAST	641	24,2160	1 2204 1	
1249	REF	1			24,2161	1 2163 0	
1250	REF	2	LAST	209	24,2162	1 2155 0	
1252					24,2163	0 0006 1	P40RCS
1253	REF	1			24,2164	3 2407 0	
1254	REF	4	LAST	641	24,2165	53=223 1	
1255	REF	2	LAST	530	24,2166	3 4735 1	
1256	REF	165	LAST	642	24,2167	0 4555 0	

TC INTERPRET
DLOAD DSU
TIG
SEC29.96
STORE TDEC1

CALRS
MIDTOAV1
TCP +2
TC P40SNEW
EXTEND
DCA MPAC
DXCH P40TMP
EXTEND
DCS SSECOP
DAS P40TMP
EXTEND
DCA P40TMP
TC LONGCALL
EBANK= TIG
2CADR TIGBLNK

TC PHASCHG
OCT 20214

TC ENDJOB
TC BANKCALL
CADR CLEANDSP
TCP ENDJOB
EBANK= TIG
EXTEND
DCA PIPTIME1
DXCH TIG
EXTEND
DCA SEC29.96
DAS TIG
TCP P40SET

EBANK= DAPDATR1
CAP V16N40
TC BANKCALL
CADR REFLASH
TCP POST41
TCP P40RCS
TCP POSTBURN
EXTEND
DCA ACADN85
DXCH AVEGEXIT
CAP 2SECS
TC BANKCALL

RETURN IN BASIC

INTEGRATION TIME GREATER THAN ALLOWED

DELTA TIME TO PREREAD (INT.INIT.)

FOR TIGBLNK

4.21 = TIGBLNK (P40TMP CS)

REMOVE RESIDUE

SET NEW TIG FOR 06 40

FOR LONGCALL OF TIG-30(OR -35)

V34 GO FINISH

PROCEED

RECYCLE

V99N40 ENTERS HERE ON A P40 BYPASS SPS

WAIT FOR CALCN85 VIA AVEGEXIT

L P40-P47

USER=3 PAGE NO. 4 E6 S3

1257	REP	9	LAST	641	24,2170	01732 0	CADR	DELAYJOB
1258	REP	3	LAST	640	24,2171	0 2212 1	P40MINDB	TCR SETMINDB -1
1259					24,2172	0 0003 1		RELINT
1260	REP	42	LAST	642	24,2173	0 5301 0	TIGNOW	TC PHASCHNG
12602					24,2174	05024 1		OCT 05024
12604					24,2175	20000 0		OCT 20000
12606	REP	1			24,2178	3 2350 0	CAP	V16N85B
1261	REP	186	LAST	642	24,2177	0 4555 0	TC	BANKCALL
1262	REP	2	LAST	642	24,2200	20810 1	CADR	REFLASH
1263	REP	3	LAST	642	24,2201	1 2204 1	TCF	POST41
1264	REP	4	LAST	643	24,2202	1 2204 1	TCF	POST41
1265	REP	1			24,2203	1 2173 1	TCF	TIGNOW
1267					24,2204	0 0008 1	POST41	EXTEND
1268	REP	1			24,2205	3 2405 1		DCA SERVCADR
1269	REP	5	LAST	642	24,2208	53=223 1	DCH	AVEGEXIT
1271	REP	39	LAST	628	24,2207	1 4108 0	TCF	GOTOPOCH
1272					24,2210	00058 1	MINDB	DEC 46
1273					24,2211	00707 1	MAXDB	DEC 455
12732	REP	17	LAST	642	E6,1488			BRANK= DAPDATR1
1274					24,2212	0 0004 0	-1	INHINT
1275	REP	13	LAST	583	24,2213	3 0032 0	SETMINDB	CA CDUX
1276	REP	4	LAST	188	24,2214	55=572 1	TS	THETADX
1277					24,2215	0 0008 1	EXTEND	
1278	REP	5	LAST	583	24,2216	3 0034 0	DCA	CDUY
1279	REP	2	LAST	107	24,2217	53=574 1	DCH	THETADY
1280	REP	1			24,2220	3 2210 0	CA	MINDB
1281	REP	2	LAST	108	24,2221	55=855 1	TS	ADB
1282	REP	26	LAST	583	24,2222	4 4707 1	CS	BIT4
1283	REP	18	LAST	643	24,2223	7 1488 0	MASK	DAPDATR1
1284	REP	19	LAST	843	24,2224	55=488 0	TS	DAPDATR1
1285	REP	155	LAST	628	24,2225	0 0002 0	TC	0
12852	REP	20	LAST	643	E6,1488			BRANK= DAPDATR1
1286					24,2228	0 0004 0	-1	INHINT
1287	REP	1			24,2227	3 2211 1	SETMAXDB	CA MAXDB
1288	REP	3	LAST	643	24,2230	55=855 1	TS	ADB
1289	REP	21	LAST	843	24,2231	4 1488 0	CS	DAPDATR1
1290	REP	27	LAST	843	24,2232	7 4707 1	MASK	BIT4
1291	REP	22	LAST	843	24,2233	27=488 0	ADS	DAPDATR1
1292	REP	156	LAST	843	24,2234	0 0002 0	TC	0

TYPE C GROUP 4 BELOW FOR NOUN 85
PRIO 20

FINISH P40/P41
V03 PROCEED WITH REST OF THE CLEAN-UP
V32 NOT GSOP RESPONSE BUT REDISPLAY N85

ROUTINE FOR SETTING
THE MINIMUM DEADBAND
IN AUTOPILOT

SHOULD BE CALLED UNDER
INTERRUPT INHIBITED.
BRANK = E6

ROUTINE FOR SETTING
THE MAXIMUM DEADBAND IN AUTOPILOT

SHOULD BE CALLED UNDER
INTERRUPT INHIBITED
BRANK = E6



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L P40-P47

USER'S PAGE NO. 5 E6 S3

P1293 PROGRAM DESCRIPTION **P41CSM**

1354 REF 23 LAST 643 E6,1466

1355 REF 1

EBANK= DAPDATR1
COUNT 24/P41

1356 REF 40 LAST 640 24,2235 0 5435 0 P41CSM

1357 REF 2 LAST 640 24,2236 00023 0

TC UPFLAG
ADRES ENG2FLAG

SET FOR RCS

1356 REF 135 LAST 642 24,2237 0 6006 1

1359 REF 14 LAST 641 24,2240 77745 1

1360 REF 14 LAST 641 24,2241 15332 1

1361 REF 4 LAST 640 24,2242 03703 0

TC INTPRET
DLOAD

FOR P41 CSTEER =0

1362 REF 1 24,2243 43145 0

1363 REF 1 24,2244 10337 1

1364 REF 1 24,2245 00700 0

1365 REF 1 24,2246 50015 0

1366 REF 1 24,2247 52015 1

1367 REF 2 LAST 644 24,2250 10337 1

1368 REF 2 LAST 644 24,2251 50015 0

DLOAD BDN
PRCS2

2JET THRUST FOR S40.1

NJETSPLG
P40S/P

NJETS = 1 2-JET

DAD GOTO
PRCS2

NJETS = 0 4-JET

P40S/P

1369 REF 11 LAST 511 24,2252 4 1011 1 P41/P40

1370 REF 76 LAST 641 24,2253 7 4712 0

1371 REF 1 24,2254 0 0006 1

1372 REF 1 24,2255 1 2257 1

1373 REF 157 LAST 643 24,2256 24 002 0

1374 REF 156 LAST 644 24,2257 0 0002 0

CS MODREG
MASK ONE

P41EXITS AT CALL LOC +1

EXTEND
BZF +2

P41

INCR 0
TC 0

P40 EXITS AT CALL LOC +2

1375 REF 4 LAST 430 24,2260 3 4675 1 TTG/0

1376 REF 18 LAST 575 24,2261 0 5027 1

1377 REF 24 LAST 644 E6,1466

1378 REF 2 LAST 643 24,2262 02173 0

1378 REF 2 LAST 643 24,2263 50066 1

CAP PRIO20
TC NOVAC

TASK (4.4 PROTECTS IN P41)

EBANK= DAPDATR1
2CADR TIGNOW

1379 REF 41 LAST 640 24,2264 0 5447 0 P40CLK

1380 REF 4 LAST 640 24,2265 00155 0

TC DOWNFLAG
ADRES TIMRFLAG

1382 REF 26 LAST 531 24,2266 1 5213 0

TCF TASKOVER

1383 REF 1 24,2267 3 2347 0 P41/DSP

1364 REF 3 LAST 641 24,2270 55=145 1

CAP V06N85B
TS NWWORD1

SET UP FOR NONFLASH V 06 N85 BY CLOCKJON

1385 REF 136 LAST 644 24,2271 0 6006 1

1386 REF 1 24,2272 77624 1

1387 REF 1 24,2273 50314 1

1388 REF 1 24,2274 77776 1

1389 REF 1 24,2275 0 0006 1

1390 REF 2 LAST 642 24,2276 3 2407 0

1391 REF 6 LAST 643 24,2277 53=223 1

TC INTPRET
CALL

COMPUTE

P40CNV85
EXIT

VGTTG IN CTRL COORDS

EXTEND
DCA ACADN85

DO CONTROL COORD CALCULATION AFTER AVEG

DXCH AVEGEXIT



L P40-P47

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1392	REF	13	LAST	641	24,2300	0 5281 1	TC	2PHSCING	
1393					24,2301	40038 0	OCT	40038	6.3=CLOCKTASK(100CS)
1394					24,2302	00234 1	OCT	234	4.23=P40S/SV(PRI012)
1395	REF	1			24,2303	1 2106 0	TCF	P40S/RS	
1396	REF	2	LAST	643	24,2304	3 2350 0	P41REDSP	V16N65B	ENTER FROM P41 SIDE OF TIGAVEG
1397	REF	4	LAST	644	24,2305	55-145 1	TS	NVWORD1	REDISPLAY NONFLASHING
1398	REF	3	LAST	642	24,2306	3 2342 0	CAP	SEC29.96 +1	
1399	REF	25	LAST	641	24,2307	0 5140 1	TC	WAITLIST	
1400	REF	25	LAST	644	E6,1466		FRANK=	DAPDATR1	
1401	REF	2	LAST	208	24,2310	02260 1	2CADR	TIG/O	
1401					24,2311	50068 1			
1402	REF	22	LAST	617	24,2312	4 4710 1	CS	BIT3	4.4 = TIG/O(2996CS), PRECHECK(-0CS)
1403	REF	1			24,2313	1 2513 0	TCF	TIGPHS	
1404					24,2314	40220 0	P40CNV85	STO	
1405	REF	1			24,2315	03730 0		OTEMP1	
1406					24,2316	00001 0		0	
1407					24,2317	41575 0	VLOAD	PUSH	
1408	REF	1			24,2320	03721 0		VGPREV	EQUALS VGTIG (TARGETTING INPUT)
1409					24,2321	77624 1	CALL		
1410	REF	1			24,2322	45426 0		S41.1	
1411	REF	6	LAST	277	24,2323	37665 0	STCALL	VGBODY	
1412	REF	2	LAST	645	24,2324	03730 0		OTEMP1	
14122	REF	26	LAST	645	E6,1466		FRANK=	DAPDATR1	
1413	REF	137	LAST	644	24,2325	0 6006 1	CALCN85	TC	INTPRET
1414					24,2326	77624 1	CALL		
1415	REF	1			24,2327	51016 1		UPDATEVG	NEW VG, S40.6(+MAYBE S40.9)
1416					24,2330	77624 1	CALL		
1417	REF	2	LAST	644	24,2331	50314 1		P40CNV85	COMPUTE VGBODY
1418					24,2332	77776 1	EXIT		
1419	REF	1			24,2333	0 3127 0	TC	SERVXT	
1420					24,2334	02217 1	PENG	2DEC	9.1168544 B-7 SPS THRUST (20500LBS), SC.AT B+7 NEWT/E4
1420					24,2335	06650 1			
1421					24,2336	00013 0	PRCS2	2DEC	.067437637 B-7 RCS ULLAGE (199.6COS10 LBS), SC.AT
1421					24,2337	06112 0			B+7 NEWTONS/E+4
A1422									
1423					24,2340	04700 1	SEC24.96	DEC	2496
1424					24,2341	00000 1	SEC29.96	2DEC	2996
1424					24,2342	05664 0			
1425					24,2343	03410 1	18SEC	DEC	1800
1426					24,2344	00204 1	P40CKLS2	OCT	204
1427					24,2345	37730 1	40CST5	OCT	37730
1428	REF	4	LAST	379	4377		OCT12	=	TEN
1429					24,2346	04123 0	V1683	VN	1683
1430					24,2347	01525 1	V06N85B	VN	0685
1431					24,2350	04125 0	V16N85B	VN	1685
1432					24,2351	01450 1	V06N40	VN	0640
1433					24,2352	24020 0	P40CK99	OCT	24020
1434					24,2353	04050 0	V16N40	VN	1640

BITS 14,12, AND5 FOR LINUS VERR 99



L P40-P47

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1435				24,2354	00027 1	OCT27/24	OCT	27
1436				24,2355	00053 1	OCT53	OCT	53
1437				24,2356	00035 1	OCT35	OCT	35
1438	REF	27	LAST	645	E6,1466		EBANK=	DAPDATR1
1439	REF	4	LAST	255	24,2357	03143 1	T5IDL24	ZCADR T5IDLOC
1439					24,2360	12066 1		
1440					24,2361	00026 0	3MDOT	DEC
A1441								86.8175796 B-16
A1442								3SEC MASS LOSS (63.6 LBS/SEC), SC,AT
A1443								B+16 KG/SEC (NOTE, EMDOT IS PAD-LOADED,
1445	REF	39	LAST	641	24,2362	3 4712 1	TST,TRIM	CAP BIT1
1446	REF	1			24,2363	1 2066 1	TCP	TRIMONLY +1
1447	REF	2	LAST	641	24,2364	3 2776 0	TIOBLNK	CAP SSSC
1446	REF	26	LAST	645	24,2365	0 5140 1	TC	WAITLIST
1449	REF	39	LAST	642	E7,1412		EBANK=	TIG
1450	REF	2	LAST	209	24,2366	02502 1	ZCADR	TIGAVEG
1450					24,2367	50067 0		
1451	REF	127	LAST	641	24,2370	3 4714 1	CAP	ZERO
1452	REF	5	LAST	645	24,2371	55=145 1	TS	MWORD1
1453	REF	4	LAST	581	24,2372	3 4761 0	CAP	PRI014
1454	REF	19	LAST	644	24,2373	0 5027 1	TC	NOVAC
1455	REF	40	LAST	646	E7,1412		EBANK=	TIG
1456	REF	1			24,2374	02143 0	ZCADR	P40BLNKR
1456	REF	1			24,2375	50067 0		
1457	REF	3	LAST	220	24,2376	4 4362 0	CS	OCT37
1458	REF	2	LAST	430	24,2377	0 4114 1	TC	NEWPHASE
1459					24,2400	00004 0	OCT	4
1460	REF	27	LAST	644	24,2401	0 5213 1	TC	TASKOVER
1461	REF	41	LAST	646	E7,1412		EBANK=	TIG
1462	REF	1			24,2402	02436 1	ACADN63	ZCADR CALCN63
1462	REF	1			24,2403	50067 0		
1463	REF	42	LAST	646	E7,1412		EBANK=	TIG
1464	REF	2	LAST	531	24,2404	03132 1	SERVACDR	ZCADR SERVEXIT
1464					24,2405	76067 1		
1465	REF	26	LAST	646	E6,1466		EBANK=	DAPDATR1
1466	REF	1			24,2406	02325 1	ACADN65	ZCADR CALCN65
1466	REF	1			24,2407	50066 1		

3SEC MASS LOSS (63.6 LBS/SEC), SC,AT
B+16 KG/SEC (NOTE, EMDOT IS PAD-LOADED,
BUT 3MDOT IS NOT A CRITICAL QUANTITY, SO
IT CAN REMAIN IN FIXED MEMORY)
SET UP FOR GIMB DRIVE TEST AND TRIM (+1)

CALL TIGAVEG IN FIVE SEC AT TIG-30

DISABLE HERE, NOT IN P40BLNKR

DONT PROTECT-RESTARTS BLANK DSKY

4.37 = TIGAVEG (500CS)

L P40-P47

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P1467 PROGRAM DESCRIPTION **P47CSM**

1506 REP 1 COUNT 24/P47

1509	REP	43	LAST	646	E7,1412		EBANK= TIG
1510	REP	167	LAST	643	24,2410	0 4555 0	TC BANKCALL
1511	REP	5	LAST	640	24,2411	17573 0	CADR R02BOTH
1512	REP	136	LAST	645	24,2412	0 6006 1	TC INTPRET
1513					24,2413	77624 1	CALRB
1514	REP	1			24,2414	27573 0	MIDTOAV2
1515	REP	267	LAST	642	24,2415	30 155 0	CAB MPAC +1
1516	REP	12	LAST	642	24,2416	55=672 1	TS P40TMP
1517	REP	27	LAST	646	24,2417	0 5140 1	TC WAITLIST
1518	REP	44	LAST	647	E7,1412		EBANK= TIG
1519	REP	2	LAST	210	24,2420	02425 0	2CADR TIGON
1519					24,2421	50067 0	

IMU STATUS CHECK

DELTA TIME TO RPEREAD (LESS THAN 1000 CS, WITH A TPAGREE, INT.INIT.)

TIGON IS REQUIRED TO MATCH TAT AND AVEG

1520	REP	43	LAST	643	24,2422	0 5301 0	TC PHASCHNG
1521					24,2423	40574 0	OCT 40574
1522	REP	62	LAST	642	24,2424	1 5112 1	TCP ENDOPJOB

A, 4.57 = TIGON (P40TMP CS)

15222	REP	13	LAST	647	E7,1672		EBANK= P40TMP
1523					24,2425	0 0006 1	EXTEND TIGON
1524	REP	1			24,2426	3 2403 1	DCA ACADN83
1525	REP	7	LAST	644	24,2427	53=223 1	DXCH AVEGEXIT
1526	REP	9	LAST	583	24,2430	3 4371 0	CAP PRIO30
1527	REP	20	LAST	646	24,2431	0 5027 1	TC NOVAC
1528	REP	45	LAST	647	E7,1412		EBANK= TIG
1529	REP	2	LAST	208	24,2432	02461 0	2CADR P47BODY
1529					24,2433	50067 0	
1530	REP	26	LAST	578	24,2434	4 4711 0	CS BIT2
1531	REP	2	LAST	645	24,2435	1 2513 0	TCP TIGPHS
1532	REP	46	LAST	647	E7,1412		EBANK= TIG
1533	REP	139	LAST	647	24,2436	0 6006 1	TC INTPRET
15333					24,2437	77601 0	SETPD
15336					24,2440	00001 0	0
1534					24,2441	53375 0	VLOAD VAD
1535	REP	1			24,2442	03665 1	DELACTL
1536	REP	1			24,2443	03433 0	DELVREP
1537	REP	1			24,2444	03460 0	STORE DV47TEMP
1538					24,2445	45006 0	PUSH CALL
1539	REP	2	LAST	645	24,2446	45426 0	S41.1
1540	REP	6	LAST	277	24,2447	37675 1	STCALL DELVIMU
1541	REP	2	LAST	531	24,2450	70436 1	S11.1
1542					24,2451	77776 1	
1543	REP	44	LAST	647	24,2452	0 5301 0	EXIT
1544					24,2453	10035 0	TC PHASCHNG
							OCT 10035

FORCE ZEROING OF N63 BEFORE SERVICER

4.2 = PRECHECK (-0CS), P47BODY (PRIO30)

SET UP PUSHLIST FOR S41.1

FOR COPYCYCLE BELOW

CALC. VI, H, HDOT FOR NOUN 62



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1545	RESP	14	LAST	561	24,2454	3 4715 0	CAP	FIVE
1546	RESP	10	LAST	589	24,2455	0 5475 1	TC	GENTRAN
1547	RESP	2	LAST	647	24,2456	01457 0	ADRES	DV47TEMP
1548	RESP	2	LAST	647	24,2457	01864 1	ADRES	DELVCTL
1549	RESP	2	LAST	645	24,2480	0 3127 0	TC	SERVXT
1550	RESP	140	LAST	847	24,2481	0 8008 1	P47BODY TC	INTPRET
1551					24,2482	77775 1	VLOAD	
1552	RESP	15	LAST	644	24,2483	15332 1		HI8ZEROS
1553	RESP	7	LAST	647	24,2484	03875 0	STORE	DELVIMU
1554	RESP	3	LAST	646	24,2485	03885 1	STORE	DELVCTL
1555					24,2486	77778 1	EXIT	
1556	RESP	3	LAST	380	24,2487	3 4782 0	P47BOD CAP	PRI015
15563	RESP	6	LAST	578	24,2470	0 5103 0	TC	PRI0CHNG
155635	RESP	45	LAST	647	24,2471	0 5301 0	TC	PHASCHNG
15564					24,2472	05024 1	OCT	05024
15565					24,2473	15000 0	OCT	15000
15566	RESP	1			24,2474	3 2348 1	P47/DSP CAP	V1883
1557	RESP	168	LAST	647	24,2475	0 4555 0	TC	BANKCALL
1558	RESP	27	LAST	628	24,2476	20824 0	CADR	GOFASH
1559	RESP	40	LAST	643	24,2477	0 4108 1	TC	GOTOPOCH
1560	RESP	41	LAST	648	24,2500	0 4108 1	TC	GOTOPOCH
1561	RESP	3	LAST	647	24,2501	1 2481 1	TCP	P47BODY

CLEAR DISPLAY AND ACCUMULATOR STORAGE
UPON INITIATION OR-ENTER-RESPONSE

LOWER PRIO THAN CALCN83 (20)
TO PREVENT INTERRUPTION OF CALCN83

TYPE C GROUP 4 BELOW FOR NOUN 83
PRIO 15

RECYCLE - CLEAR ACCUMULATED VELOCITY

L P40-P47

USER=3 PAGE NO. 10 BY 83

P1563 ROUTINE **TIG-30** DESCRIPTION

1588	REF	47	LAST	647	E7,1412				EBANK= TIG
1589	REF	2	LAST	640 TO	644	155	155*		COUNT 24/P40
1590	REF	2	LAST	640	24,2502	0	2252	0	TIGAVEG TC P41/P40
1591	REF	1			24,2503	1	2304	0	TCP P41REDSP
1592	REF	2	LAST	640	24,2504	3	2351	1	CAP V06N40
1593	REF	6	LAST	646	24,2505	55	145	1	TS NMFORD1
1594	REF	1			24,2506	3	2340	1	CAP SEC24.96
1595	REF	28	LAST	647	24,2507	0	5140	1	TC WAITLIST
1596	REF	48	LAST	649	E7,1412				EBANK= TIG
1597	REF	3	LAST	210	24,2510	0	2521	0	ZCADR TIG-5
1597					24,2511	50087	0		
1598	REF	23	LAST	589	24,2512	4	6211	1	CS SIX
1599	REF	3	LAST	646	24,2513	0	4114	1	TIGPHS TC NEWPHASE
1600					24,2514	00004	0		OCT 4
1601	REF	2	LAST	530	24,2515	10	763	1	PRECHECK CCS PHASES
1602	REF	28	LAST	646	24,2516	1	5213	0	TCP TASKOVER
1603	REF	40	LAST	624	24,2517	0	4574	0	TC POSTJUMP
1604	REF	2	LAST	212	24,2520	76604	1		CADR PREREAD

TASK (4.37 PROTECTS)
P41

UNBLANK DISPLAY

4.6 = TIG-5 (2496CS), PRECHECK (-0CS)
ENTRY FROM P41REDSP (P41) WITH A=-4, OR
FROM TIGON (P47) WITH A=-2

HAS SERVICER BEEN RESTARTED
YES, DONT START ANOTHER ONE

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P1605 ROUTINE **TIG-5** DESCRIPTION

16242	RESP	49	LAST	649	87,1412			
1625	RESP	3	LAST	646	24,2521	3	2776	0
1626	RESP	29	LAST	649	24,2522	0	5140	1
1627	RESP	29	LAST	646	E6,1466			
1628	RESP	3	LAST	211	24,2523		02537	1
1628					24,2524		50066	1
1629	RESP	20	LAST	562	24,2525	4	4702	1
1630	RESP	7	LAST	649	24,2528	55	145	1

```
EBANK= TIG
CAP      5 SEC
TC       WAITLIST
EBANK= DAPDATR1
2CADR   TIG-0
```

WILL CAUSE V99 FLASH

1631	REP	14	LAST	645	24,2527	0 5281	1
1632					24,2530	40074	0
1633					24,2531	00033	1

TC	2PHSCNG
OCT	40074
OCT	00033

A, 4.7 = TIG-0 (500CS)
A, 3.3 = S40-13 (PRIO₂₀)

1634	REP	5	LAST	644	24, 2532	3 4675	1
1635	REP	22	LAST	553	24, 2533	0 5042	1
1636	REP	6	LAST	207	ET, 1427		
1637	REP	2	LAST	207	24, 2534	02404	0
1637					24, 2535	34087	1
1638	REP	29	LAST	649	24, 2536	1 5213	0

CAP	PRI020
TC	PINDVAC
EBANK=	TGO
2CADR	S40.13
TCP	TASKOVER

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P1639 ROUTINES **TIG-0** AND **IGNITION** DESCRIPTION

1648	RESP	30	LAST	650	E6,1466		EBANK=	DAPDTR1	TASK, 4.7 PHASE, OR 4.77 (-OCS) IN R40	
16485	RESP	2	LAST	195	24,2537	4 0103 1	TIG-0	CS	FLAGWRD7	SET IGN FLAG
16486	RESP	21	LAST	639	24,2540	7 4676 0		MASK	BIT13	
16487	RESP	3	LAST	651	24,2541	26 103 1		ADS	FLAGWRD7	
1649	RESP	4	LAST	651	24,2542	30 103 0		CAE	FLAGWRD7	CHECK ASTN FLAG FOR V99 RESPONSE
1650	RESP	23	LAST	496	24,2543	7 4677 1		MASK	BIT12	
1651					24,2544	0 0006 1		EXTEND		
1652	RESP	30	LAST	650	24,2545	1 5213 0		BZP	TASKOVER	WAIT FOR V99P
16522	RESP	3	LAST	649	24,2546	3 2351 1		CAP	V06N40	CLEAR THE V99 (IN CASE OF A RESTART
16524	RESP	8	LAST	650	24,2547	55=145 1		TS	NVWORD1	DURING THE V99 SEQUENCE)
1653	RESP	46	LAST	646	24,2550	0 5301 0		TC	PHASCHNG	V99P HAS COME ALREADY, DO IGNITION NOW
1654					24,2551	00614 1		OCT	00614	A, 4.61 = IGNITION (-OCS) TRASE OLD
1660	RESP	14	LAST	643	24,2552	30 032 0	IGNITION	CAE	CDUX	SAVE FOR ROLL DAP REFERENCE OGAD
1661	RESP	1			24,2553	55=450 0		TS	OGAD	V99PJOB (CLOCKJOB) SETS UP IGNITION
1662					24,2554	0 0006 1		EXTEND		TASK (4.61 PROTECTION)
1663	RESP	19	LAST	577	24,2555	3 0025 0		DCA	TIME2	FOR RESTARTS
1664	RESP	4	LAST	169	24,2556	53=337 0		DXCH	TEVENT	
1665	RESP	10	LAST	563	24,2557	4 0101 0		CS	FLAGWRD5	SET ENGONFLO
1666	RESP	35	LAST	577	24,2560	7 4704 1		MASK	BIT7	
1667	RESP	11	LAST	651	24,2561	28 101 0		ADS	FLAGWRD5	
1668	RESP	22	LAST	651	24,2562	3 4676 1	SPSQN	CAP	BIT13	TURN ON SPS ENGINE
1669					24,2563	0 0006 1		EXTEND		
1670	RESP	22	LAST	564	24,2564	05 011 1		WOR	DSALMOUT	
1671	RESP	21	LAST	650	24,2565	3 4702 0	IMPULCHK	CAP	BIT9	CHECK FOR IMPULSIVE BURN
1672	RESP	8	LAST	474	24,2566	7 0076 1		MASK	FLAGWRD2	
1673	RESP	148	LAST	564	24,2567	10 000 0		CCS	A	
1674	RESP	1			24,2570	1 2655 1		TCP	IMPLBURN	IMPULSIVE
1675	RESP	13	LAST	536	24,2571	4 0102 0		CS	FLAGWRD6	NON-IMPULSIVE, SET STRULLSW FOR STEERULL
1676	RESP	23	LAST	651	24,2572	7 4676 0		MASK	BIT13	
1677	RESP	14	LAST	651	24,2573	26 102 0		ADS	FLAGWRD6	
1678	RESP	9	LAST	532	24,2574	4 4105 0	PREPTVC	CS	OCT60000	RESET TS BITS
1679	RESP	15	LAST	651	24,2575	7 0102 0		MASK	FLAGWRD6	
1680	RESP	16	LAST	651	24,2576	54 102 0		TS	FLAGWRD6	
1681					24,2577	0 0006 1		EXTEND		KILL RCS
1682	RESP	1			24,2600	3 2360 0		DCA	TSIDL24	
1683	RESP	8	LAST	539	24,2601	53=313 0		DXCH	TSLOC	
1684	RESP	20	LAST	606	24,2602	4 6214 1		CS	THREE	4.3 = DOTVCON (40CS)
1685	RESP	4	LAST	649	24,2603	0 4114 1		TC	NEWPHASE	
1686					24,2604	00004 0		OCT	4	

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1687	REF	1		24,2605	0 5156 0	TC	FIXDELAY
1688				24,2606	00050 1	DEC	40
1689	REF	40	LAST	646	24,2607	4 4712 0	DOTVCON CS
1690	REF	2	LAST	103	24,2610	55-654 0	TS
1691	REF	128	LAST	646	24,2611	3 4714 1	CAP
1692	REF	2	LAST	103	24,2612	55-661 0	TS
1693	REF	10	LAST	651	24,2613	4 4105 0	CS
1694	REF	17	LAST	651	24,2614	7 0102 0	MASK
1695	REF	31	LAST	411	24,2615	6 4674 0	AD
1696	REF	18	LAST	652	24,2616	54 102 0	TS
1697	REF	21	LAST	651	24,2617	3 6214 0	CAP
1698	REF	65	LAST	616	24,2620	54 001 1	TS
1699					24,2621	4 0000 0	COM
1700	REF	2	LAST	181	24,2622	52 765 1	DXCH
1701	REF	15	LAST	648	24,2623	4 4715 1	CS
1702	REF	5	LAST	651	24,2624	0 4114 1	TC
1703					24,2625	00004 0	OCT
1704	REF	14	LAST	577	24,2626	3 4672 0	CAP
1705	REF	6	LAST	539	24,2627	54 030 0	TS
1706					24,2630	0 0006 1	EXTEND
1707	REF	1			24,2631	3 3001 0	DCA
1708	REF	9	LAST	651	24,2632	53-313 0	DXCH
1709	REF	2	LAST	652	24,2633	0 5156 0	TC
1710					24,2634	00240 1	DEC
1711	REF	24	LAST	651	24,2635	3 4676 1	DOSTRULL CAP
1712	REF	19	LAST	652	24,2636	7 0102 0	MASK
1713	REF	149	LAST	651	24,2637	10 000 0	CCS
1714	REF	1			24,2640	0 2646 1	TCR
1715	REF	1			24,2641	0 2651 1	TCR
1716					24,2642	0 0006 1	EXTEND
1717	REF	12	LAST	197	24,2643	3 4714 1	DCA
1718	REF	3	LAST	197	24,2644	52 761 0	DXCH
1719	REF	31	LAST	651	24,2645	1 5213 0	ENDIGN
1720	REF	9	LAST	651	24,2646	4 0076 1	TCF
1721	REF	18	LAST	415	24,2647	7 4700 0	CS
1722	REF	10	LAST	652	24,2650	26 076 1	MASK
1723	REF	129	LAST	652	24,2651	3 4714 1	ULAGEOFF CAP
1724					24,2652	0 0006 1	EXTEND
1725	REF	2	LAST	179	24,2653	01 005 0	WRITE

0.4 SECOND DELAY FOR THRUST BUILDUP

SET TVCPHASE = TVCDAPON CALL (PRESHDAP)

SET TVCEXECUTIVE PHASE

SET TS BITS TO INDICATE TVC TAKEOVER....
BITS 15,14 = 10

6.3 = CLOKTSK (100CS), DROPPING PRE40.6
WHICH IS HANDLED NOW BY REDOTVC

4.5 = DOSTRULL (160 CS)

SET TIMES FOR STARTING RIGHT AWAY

(TVCDAPON)
(KILLS RCS DAP)

0.4 + 1.6 = 2.0 SEC FOR ULLAGE-OFF AND
STEERING (IF NON-IMPULSIVE)

CHECK STRULLSW FOR IMPULSIVE BURN

NON-IMPULSIVE, STEERING AND ULLAGE OFF
ULLAGE OFF (ONLY, OR AGAIN)

KILL GROUP 4 (DP NEG0 = -0,+0)

SET STEERSW

ZERO CHANNEL 5



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1726 REP 159 LAST 644 24,2654 0 0002 0
1727 REP 25 LAST 652 24,2655 4 4676 0
17271 REP 20 LAST 652 24,2656 7 0102 0
17272 REP 21 LAST 653 24,2657 54 102 0

IMPLBURN TC 0
CS BIT13
MASK FLAGWRD6
TS FLAGWRD6

RESET STRULLSW (COULD BE AN IMPULSIVE
ENGINE FAIL)

17273 REP 2 LAST 641 24,2660 0 3304 0

TCR E7SETTIER

1728 REP 50 LAST 650 E7,1412
1729 24,2661 0 0006 1
1730 REP 7 LAST 650 24,2662 3 1430 1
1731 REP 51 LAST 653 24,2663 53=413 1
1732 24,2664 0 0006 1
1733 REP 20 LAST 651 24,2665 3 0025 0
1734 REP 52 LAST 653 24,2666 21=413 1

EBANK= TIG
EXTEND
DCA TGO
DACH TIG
EXTEND
DCA TIME2
DAS TIG

PREPARE FOR R1 OF V06N40 (CLOCKTASK)

1735 REP 8 LAST 653 24,2667 31=430 1
1736 REP 30 LAST 650 24,2670 0 5140 1
1737 REP 9 LAST 653 E7,1427
1738 REP 2 LAST 207 24,2671 02706 1
1738 24,2672 50067 0
1739 REP 15 LAST 650 24,2673 0 5261 1
1740 24,2674 40153 1
1741 24,2675 05014 1
17412 24,2676 77777 0

CAB TGO +1
TC WAITLIST
EBANK= TGO
ZCADR ENGINOFF

(TPAGREE IN S40.13, LESS THAN 600CS)

TC 2PHSCHNG
OCT 40153
OCT 05014
DEC -0

PROTECT....
A, 3.15 = ENGINOFF (TGO+1)....NOTE GROUP
C, DELTAT NEXT, TASK BELOW, IN
-0 CS

1742 REP 22 LAST 651 24,2677 4 4702 1
1743 REP 11 LAST 652 24,2700 7 0076 1
1744 REP 12 LAST 653 24,2701 54 076 1

CS BIT9
MASK FLAGWRD2
TS FLAGWRD2

RESET IMPULSW, ENGINOFF IS NOW SET UP

1745 REP 1 24,2702 0 3307 0
1746 REP 31 LAST 651 E6,1466

TCR E6SETTIER
EBANK= DAPDATR1

17462 REP 130 LAST 652 24,2703 3 4714 1
17463 REP 2 LAST 210 24,2704 55=444 0

CAP ZERO
TS V97VCNTR

SET UP V97VCNTR IN CASE ENGINOFF (MASS-
BACK) ARRIVES BEFORE TVCDAPON

1747 REP 1 24,2705 1 2574 1
1753 REP 10 LAST 653 E7,1427
17532 REP 2 LAST 653 24,2706 0 3307 0
17533 REP 32 LAST 653 E6,1466
1754 REP 4 LAST 274 24,2707 31=474 1
1755 REP 3 LAST 194 24,2710 55=662 0
1756 REP 16 LAST 653 24,2711 0 5261 1
1757 24,2712 00003 1
1758 24,2713 40634 1
1759 REP 2 LAST 194 24,2714 0 2737 0
1760 REP 1 24,2715 4 2354 0

TCR PREPTVC
EBANK= TGO
ENGINOFF TCR E6SETTIER
EBANK= DAPDATR1
CAB CSMASS
TS MASSIMP
TC 2PHSCHNG
OCT 00003
OCT 40634
DOSPSOFF TCR SPSOFF
CS OCT27/24

E7 FORCED BY 3.15SPOT VARIABLE DELTA-T
TASK, 3.15 PHASE (TGO+1 CS) GET E6

COPYCYCLE FOR MASSBACK

KILL GROUP 3 PROTECTION OF ENGINOFF, DO
A, 4.63 = DOSPSOFF (-0CS)
SHUT DOWN SPS, MASS UPDATES, ETC.
(OCTAL 27)

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1761	REF	6	LAST	652	24,2716	0 4114 1	TC	NEWPHASE
1762					24,2717	00004 0	OCT	4
1763	REF	3	LAST	652	24,2720	0 5156 0	TC	FIXDELAY
1764					24,2721	00372 1	DEC	250
1765	REF	2	LAST	199	24,2722	0 2227 1	DOTVCRCS	TCR SETMAXDB
1766	REF	25	LAST	540	24,2723	0 4633 0	TC	IBKCALL
1767	REF	2	LAST	194	24,2724	42010 0	CADR	RCS DAPCN
17672	REF	26	LAST	654	24,2725	0 4633 0	TC	IBKCALL
17673	REF	3	LAST	246	24,2726	13207 0	CADR	MASSPROP
1768	REF	2	LAST	194	24,2727	0 3003 1	TCR	TVCZAP
1769	REF	47	LAST	651	24,2730	0 5301 0	TC	PHASCHG
1770					24,2731	00354 0	OCT	00354
1771	REF	2	LAST	179	24,2732	3 4603 0	CAP	PRI012
1772	REF	21	LAST	647	24,2733	0 5027 1	TC	NOVAC
1773	REF	33	LAST	653	E6,1466		EBANK=	DAPDTR1
1774	REF	3	LAST	642	24,2734	02155 1	2CADR	POSTBURN
1774					24,2735	50066 1		
1775	REF	32	LAST	652	24,2736	1 5213 0	TCF	TASKOVER
1776	REF	34	LAST	654	E6,1466		EBANK=	DAPDTR1
1783					24,2737	0 0006 1	SPSOFF	EXTEND
1784	REF	21	LAST	653	24,2740	3 0025 0	DCA	TIME2
1785	REF	5	LAST	651	24,2741	53=337 0	DXCH	TEVENT
1786	REF	36	LAST	651	24,2742	4 4704 1	CS	BIT7
1787	REF	12	LAST	651	24,2743	7 0101 0	MASK	FLAGWRD5
1788	REF	13	LAST	654	24,2744	54 101 0	TS	FLAGWRD5
1789	REF	26	LAST	653	24,2745	4 4676 0	CS	BIT13
1790					24,2746	0 0006 1	EXTEND	
1791	REF	23	LAST	651	24,2747	03 011 1	WAND	DSALMOUT
1792	REF	3	LAST	653	24,2750	31=444 1	MASSBACK	CAB V97VCNTR
A1793								
A1794								
1795					24,2751	0 0006 1	EXTEND	
1796	REF	1			24,2752	7 0110 0	MP	EMDOT
1797	REF	150	LAST	652	24,2753	22 000 1	LXCH	A
1798					24,2754	0 0006 1	EXTEND	
1799	REF	9	LAST	511	24,2755	7 4734 1	MP	1SEC
1800	REF	4	LAST	653	24,2756	6 1662 1	AD	MASSIMP
1801	REF	5	LAST	653	24,2757	55=474 0	TS	CSMASS
1806	REF	32	LAST	652	24,2760	3 4674 0	RESTIRIM	CAP BIT15
1807	REF	9	LAST	574	24,2761	7 0105 1	MASK	FLAGWRD9
1808					24,2762	0 0006 1	EXTEND	

4.27 = DOTVCRCS (250 CS)

2.5 SECOND DELAY FOR SPS TAILOFF

WIDE DEADBAND FOR CUTOFF TRANSIENT

SET UP RCS DAP (KILLS TVCDAPS, SETS TS BITS, WAITS 0.6SEC FOR TVCEXEC DIE)

UPDATE WEIGHT/G AND MASS-PROPERTIES FOR RCS DAP STARTUP IN 0.6 SECONDS

WIPE OUT TVC, TURN OFF CLOKASK

A, 4.35 = POSTBURN (NOVAC, PRI012)
SET UP POSTBURN V16N40 JOB

(SETMAXDB IN POST41)

ESTABLISH SPSOFF TEVENT

RESET ENGONFLO

(RESTARTS WILL SHUT DOWN SPS NOW)
SHUT DOWN SPS ENGINE

RESTORE PART OF PRE-DECREMENTED MASS
V97VCNTR = VCNTR UNLESS V97 IS
ACTIVE. ONLY V97VCNTR IS THEN RIGHT
VCNTR COUNTS 1/2-SECONDS IN TVC EXEC
MDOT, SC, AT B+3 KG/CS

DEC 100
CORRECTION IS ACCURATE TO 5 CS OF FLOW
(1.44 KG OR 0.4 BITS)

CHECK FOR SWITCHOVER, SELECT BEST TRIMS
FOR NEXT IGNITION (OR REIGNITION)

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1809	REP	1		24,2763	1 2785 0	BZF	DBARTRIM
1810	REP	160	LAST	653	24,2784	0 0002 0	TC
18105	REP	2	LAST	102	24,2785	31=821 0	DBARTRIM
1811	REP	12	LAST	275	24,2786	55=425 1	CAB
1812	REP	2	LAST	102	24,2787	31=823 1	TS
1813	REP	2	LAST	275	24,2770	55=428 1	CAB
1814	REP	161	LAST	655	24,2771	0 0002 0	TS
							YACTOFF
							TC
							Q
1815	REP	35	LAST	654	E6,1486		EBANK=
1816	REP	1			24,2772	03117 0	DAPDATR1
1816	REP	1			24,2773	50088 1	2CADR
1817					24,2774	37703 1	STEERING
1818					24,2775	00000 1	STEERADS
1819					24,2776	00784 1	2CADR
18195					24,2777	02202 0	TVCDAPON
1820	REP	36	LAST	855	E6,1488		
1821	REP	1			24,3000	02030 0	
1821	REP	1			24,3001	36088 1	
1822					24,3002	0 0004 0	
1823	REP	1			24,3003	4 2777 0	
1824					24,3004	0 0008 1	
1825	REP	26	LAST	539	24,3005	03 012 1	
1826	REP	41	LAST	852	24,3006	4 4712 0	
1827	REP	23	LAST	448	24,3007	55=303 1	
18271	REP	131	LAST	853	24,3010	3 4714 1	
18272	REP	9	LAST	851	24,3011	55=145 1	
1828	REP	19	LAST	852	24,3012	4 4700 0	
1829	REP	5	LAST	851	24,3013	7 0103 1	
1830	REP	6	LAST	855	24,3014	54 103 1	
1831	REP	182	LAST	855	24,3015	0 0002 0	
1832	REP	37	LAST	655	E6,1488		
1833					24,3016	43020 1	
1834	REP	3	LAST	845	24,3017	03730 0	
1835	REP	6	LAST	840	24,3020	01307 1	
1838	REP	1			24,3021	51045 1	
1837					24,3022	50135 0	
1838	REP	3	LAST	840	24,3023	03347 1	
1839	REP	1			24,3024	51051 1	
1840					24,3025	53375 0	
1841	REP	2	LAST	105	24,3026	03351 0	
1842	REP	2	LAST	847	24,3027	03433 0	
1843	REP	1			24,3030	03357 0	
1844					24,3031	77778 1	
1845	REP	79	LAST	644	24,3032	3 4712 1	
1846	REP	4	LAST	855	24,3033	6 1746 0	
1847	REP	2	LAST	105	24,3034	55=747 0	

PRE-SWITCHOVER
POST-SWITCHOVER, SO LEAVE TRIMS AS ARE

UPDATE TRIMS WITH DELP,YBAR

MAKE DP 5SEC

BITS 2,8,11 FOR CHANNEL 12 TVC/OPTICS

DISABLE TVC AND OPT ERR CNTRS, REENGAGE
OPTICS DAC

ENABLE T4RUPT OPTICS MONITOR....PERMIT
OPTICS-ZERO BUT NOT OPTICS-DRIVE
CLEAR NWORD1 IN CASE CLOCKJOB WAITING

CLEAR TIMRFLAG TO STOP CLKTASK

-1 INHINT
TVCZAP CS OCT02202
EXTEND
WAND CHAN12
CS BIT1
TS OPTIND
CAP ZERO
TS NWORD1
CS BIT11
MASK FLAGWRD7
TS FLAGWRD7
TC 0
EBANK= DAPDATR1
UPDATEVGV STQ RQN
OTEMP1
XDELVFLG
CALL40.6

SLOAD RYN
NBRCYCLS
SETUP.9

VLOAD VAD
DELVSUM
DELVRFP
STORE DELVSUMP
EXIT
CA ONE
AD NBRCYCLS
TS NBRCYCLP



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TYPE B RESTART BELOW AND 5.3 REREADACCS

1848	REP	48	LAST	654	24,3035	0 5301 0	TC	PHASCHNG
1849					24,3036	10035 0	OCT	10035
1850	REP	3	LAST	655	24,3037	3 1747 1	CA	NBRCYCLP
1851	REP	5	LAST	655	24,3040	55-746 1	TS	NBRCYCLS
1852	REP	141	LAST	648	24,3041	0 6006 1	TC	INTPRET
1853					24,3042	77775 1	VLOAD	
1854	REP	2	LAST	655	24,3043	03357 0		DELVSUMP
1855	REP	3	LAST	655	24,3044	03351 0	STORE	DELVSUM
1856					24,3045	77624 1	CALL40.8	CALL
1857	REP	1			24,3046	34130 1		S40.8
1858					24,3047	77650 1	GOTO	
1859	REP	4	LAST	655	24,3050	03730 0		QTEMP1
1860					24,3051	67214 1	SETUP.9	BON
1861	REP	1			24,3052	01310 1		SLOAD
1862	REP	1			24,3053	51066 0		FIRSTPLG
1863	REP	4	LAST	656	24,3054	03350 1		SURELY.9
1864					24,3055	74301 0		NBRCYCLP
1865	REP	28	LAST	636	24,3056	00047 1	NORM	VXSC
1866	REP	2	LAST	122	24,3057	03705 0		X1
1867					24,3060	53257 1	VSR*	VAD
1868					24,3061	20563 0		0 -14D,1
1869	REP	1			24,3062	03646 0		VGTEMP
1870					24,3063	77651 0	VSU	
1871	REP	4	LAST	656	24,3064	03351 0		DELVSUM
1872	REP	2	LAST	645	24,3065	03721 0	STORE	VGPREV
1873					24,3066	77776 1	SURELY.9	EXIT
1874	REP	6	LAST	259	24,3067	3 4676 1	CAP	PRI010
1875	REP	23	LAST	650	24,3070	0 5042 1	TC	FINDVAC
1876	REP	38	LAST	655	26,1466		EBANK=	DAPDATR1
1877	REP	1			24,3071	02257 0	ZCADR	S40.9
1877	REP	1			24,3072	34086 0		
1878	REP	17	LAST	653	24,3073	0 5261 1	TC	2PHSCHNG
1879					24,3074	00051 0	OCT	00051
1880					24,3075	10035 0	OCT	10035
1881	REP	142	LAST	656	24,3076	0 6006 1	TC	INTPRET
1882					24,3077	77775 1	VLOAD	
1883	REP	9	LAST	536	24,3100	01171 1	RN	
1884	REP	11	LAST	545	24,3101	27570 0	STOVL	RINIT
1885	REP	9	LAST	536	24,3102	01177 1		VN
1886	REP	10	LAST	545	24,3103	17576 0	STOVL	VINIT
1887	REP	6	LAST	634	24,3104	01205 1		PIPTIME
1888	REP	2	LAST	120	24,3105	03474 0	STORE	TNIT
1889					24,3106	77621 1	RDSU	
1890	REP	9	LAST	633	24,3107	03656 1		TPASS4
1891	REP	9	LAST	633	24,3110	27423 1	STOVL	DELT4
1892	REP	16	LAST	648	24,3111	15332 1		HI6ZEROS
1893	REP	5	LAST	656	24,3112	17351 0	STOVL	DELVSUM

(NORM HANDLES ZERO PROPERLY)

A, 1.5 = RPD040.9, PRI0 10

ACTIVE VEHICLE RADIUS VECTOR AT T1

ACTIVE VEHICLE VELOCITY VECTOR AT T1

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1694	REF	17	LAST	656	24,3113	15332 1			
1695	REF	6	LAST	658	24,3114	03347 1		STORE	MBRCYCLS
1696					24,3115	77650 1		GOTO	
1697	REF	2	LAST	655	24,3116	51045 1			CALL40.6
1698	REF	39	LAST	656	E8,1466			ERANK=	DAPDATR1
1699	REF	143	LAST	658	24,3117	0 6006 1	STEERING	TC	INTPRET
1900					24,3120	77624 1		CALL	
1901	REF	2	LAST	645	24,3121	51018 1			UPDATEVG
1902					24,3122	77776 1		EXIT	
1903	REF	23	LAST	653	24,3123	3 4702 0		CAP	BIT9
1904	REF	13	LAST	653	24,3124	7 0076 1		MASK	FLAGWRD2
1905	REF	151	LAST	654	24,3125	10 000 0		CCS	A
1906					24,3126	1 3131 0		TCF	+3
1907	REF	41	LAST	649	24,3127	0 4574 0	SERVXT	TC	POSTJUMP
1908	REF	3	LAST	648	24,3130	77132 1		CADR	SERVEXT
1909	REF	27	LAST	654	24,3131	3 4676 1		CAP	BIT13
1910					24,3132	0 0006 1		EXTEND	
1911	REF	24	LAST	654	24,3133	02 011 0		RAND	DSALMOUT
1912					24,3134	0 0006 1		EXTEND	
1913	REF	3	LAST	648	24,3135	1 3127 1		BZF	SERVXT
1914	REF	3	LAST	653	24,3138	0 3304 0		TCR	ETSETTER
1916	REF	53	LAST	653	E7,1412			ERANK=	TIG
1917					24,3137	0 0004 0		INHINT	
1918					24,3140	0 0006 1		EXTEND	
1919	REF	54	LAST	657	24,3141	3 1413 0		DCA	TIG
1920	REF	268	LAST	647	24,3142	52 155 1		DXCH	MPAC
1921					24,3143	0 0006 1		EXTEND	
1922	REF	22	LAST	854	24,3144	4 0025 1		DCS	TIME2
1923	REF	269	LAST	857	24,3145	20 155 1		DAS	MPAC
1924	REF	1			24,3146	0 7224 1		TCR	DPAGREE
1925	REF	270	LAST	657	24,3147	30 155 0		CAE	MPAC +1
1926	REF	152	LAST	657	24,3150	10 000 0		CCS	A
1927					24,3151	1 3154 0		TCF	+3
1928					24,3152	1 3154 0		TCF	+2
1929	REF	132	LAST	655	24,3153	3 4714 1		CAP	ZERO
1930	REF	60	LAST	855	24,3154	6 4712 1		AD	ONE
1931	REF	66	LAST	852	24,3155	58 001 0		XCH	L
1932	REF	133	LAST	857	24,3158	3 4714 1		CA	ZERO
1933	REF	11	LAST	853	24,3157	53=430 0		DXCH	TGO
1934	REF	12	LAST	857	24,3160	3 1430 1		CA	TGO +1
1935	REF	31	LAST	853	24,3161	0 5140 1		TC	WAITLIST
1936	REF	13	LAST	857	E7,1427			ERANK=	TGO
1937	REF	3	LAST	653	24,3162	02706 1		ZCADR	ENGINEOFF
1937					24,3163	50067 0			
1938	REF	18	LAST	656	24,3164	0 5261 1		TC	2PHSCHNG
1939					24,3165	40153 1		OCT	40153
1940					24,3166	10035 0		OCT	10035
19402	REF	42	LAST	644	24,3167	0 5447 0		TC	DOWNFLAG
19403	REF	2	LAST	199	24,3170	00044 1		ADRES	IMPULSW

CHECK IMPULSW

PRE-IGNITE, REQUEST ENG-OFF, OR POST-OFF

CHECK ENGINE-ON/-OFF

ENGINE-OFF, SO PRE-IGNITE OR POST-OFF

(LESS THAN 8 (OR 4) SECONDS TO GO)
PROTECT AGAINST NEG/ZRO W.L. CALL

A, 3.15 = ENGINEOFF (TGO+1)...NOTE GROUP
B, 5.3 = REREADAC, AND START BELOW
CLEAR IMPULSW, ENGINEOFF IS NOW SET UP
RESTARTS OK



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1941 REP 4 LAST 657 24,3171 1 3127 1 TCP SERVXT



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P1942 ROUTINE **CLOCKTASK** DESCRIPTION

19542	RESP	55	LAST	657	E7,1412	EBANK=	TIG
1955	RESP	20	LAST	655	24,3172 3 4700 1	CLOCKTASK	BIT11
1956	RESP	7	LAST	655	24,3173 7 0103 1	MASK	FLAGWD7
1957	RESP	153	LAST	657	24,3174 10 000 0	CCS	A
1958	RESP	1			24,3175 1 3201 0	TCP	CLOCKON
1959	RESP	49	LAST	656	24,3176 0 5301 0	TC	PHASCHNG
1960					24,3177 00006 1	OCT	00006
1961	RESP	33	LAST	654	24,3200 0 5213 1	TC	TASKOVER
1962					24,3201 0 0006 1	CLOCKON	EXTEND
1963	RESP	23	LAST	657	24,3202 3 0025 0	DCA	TIME2
1964	RESP	7	LAST	276	24,3203 53=661 0	DYCH	TTOGO
1965					24,3204 0 0006 1	EXTEND	
1966	RESP	56	LAST	659	24,3205 4 1413 1	DCS	TIG
1967	RESP	8	LAST	659	24,3206 21=661 0	DAS	TTOGO
1968	RESP	10	LAST	654	24,3207 3 4734 0	SETCLOCK	CAP 1SEC
1969	RESP	32	LAST	657	24,3210 0 5140 1	TC	WAITLIST
1970	RESP	57	LAST	659	E7,1412	EBANK=	TIG
1971	RESP	5	LAST	641	24,3211 03172 0	2CADR	CLOCKTASK
1971					24,3212 50067 0		
1972	RESP	10	LAST	655	24,3213 11=145 1	CCS	NVWORD1
1973					24,3214 1 3217 1	TCP	+3
1974	RESP	1			24,3215 1 3227 1	TCP	SETTR6
19742					24,3216 1 3217 1	TCP	+1
1975	RESP	2	LAST	644	24,3217 4 2347 1	CS	V06N85B
19752	RESP	11	LAST	659	24,3220 6 1145 0	AD	NVWORD1
19753					24,3221 0 0006 1	EXTEND	
19754	RESP	1			24,3222 1 3232 0	BZF	SETUPDYN
1976	RESP	2	LAST	575	24,3223 3 7664 1	CAP	PRI027
1977	RESP	22	LAST	654	24,3224 0 5027 1	TC	NOVAC
1978	RESP	40	LAST	657	E8,1466	EBANK=	DAPDATR1
1979	RESP	1			24,3225 03244 0	2CADR	CLOCKJOB
1979	RESP	1			24,3226 50066 1		
1980	RESP	12	LAST	532	24,3227 4 0025 1	SETTR6	CS TIME1
1981	RESP	1			24,3230 55=065 1	TS	TRASE6
1982	RESP	34	LAST	659	24,3231 1 5213 0	TCP	TASKOVER
19822	RESP	3	LAST	659	24,3232 3 7664 1	SETUPDYN	CAP PRI027
198222	RESP	24	LAST	656	24,3233 0 5042 1	TC	FINDVAC
198224	RESP	41	LAST	659	E8,1466	EBANK=	DAPDATR1
198226	RESP	1			24,3234 03237 1	2CADR	DYNDISP
198226	RESP	1			24,3235 50066 1		
198228	RESP	2	LAST	659	24,3236 1 3227 1	TCP	SETTR6

IS TIMEFLAG SET

KILL RESTART

CHECK FOR V06N85B (P41)

V06N65, SO UPDATE N85 FOR DYNAMIC DISP

SET GROUP8 TIMERASE

SET UP A JOB TO UPDATE N85 (FOR P41=V06)

CLOSE OUT CLOCKTASK



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19823	REF 144	LAST	857	24,3237	0 6006 1	DYNDISP	TC	INTPRET	UPDATE N85 FOR A DYNAMIC V06N85 IN P41,-----
198232				24,3240	77624 1		CALL		PRIOR TO BLANKING AND AVEG (V16N85)
198234	REF	3	LAST	645	24,3241	50314 1			
198236					24,3242	77776 1	EXIT	P40CNV85	
198238	REF	1			24,3243	1 3254 0	TCP	CKNVWD1	

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P1983 ROUTINE **CLOCKJOB** DESCRIPTION

2003	REP	42	LAST	659	E6,1466		EBANK=	DAPDATR1
2004	REP	15	LAST	651	24,3244	3 0032 0	CLOCKJOB	CA CDUX
200401	REP	1			24,3245	54 772 1	TS	CDUSPOTX
200402	REP	6	LAST	643	24,3246	3 0033 1	CA	CDUY
200403	REP	1			24,3247	54 766 1	TS	CDUSPOTY
200404	REP	9	LAST	563	24,3250	3 0034 0	CA	CDUZ
200405	REP	1			24,3251	54 770 0	TS	CDUSPOTZ
200406	REP	169	LAST	648	24,3252	0 4555 0	TC	BANKCALL
20041	REP	1			24,3253	47510 0	CADR	QUICTRIG
20042	REP	1			24,3254	0 0004 0	OKNWORD1	INHINT
20044	REP	12	LAST	659	24,3255	11=145 1	CCS	NWORD1
2005	REP	1			24,3256	1 3301 1	TCF	NOFLASH
2006	REP	83	LAST	647	24,3257	1 5112 1	TCF	ENDOFJOB
2007	REP	1			24,3260	1 3270 0	TCF	ENGREQST
2008	REP	4	LAST	651	24,3261	3 2351 1	PAILEDSP	CAP V06N40
2009	REP	170	LAST	661	24,3262	0 4555 0	TC	BANKCALL
2010	REP	13	LAST	628	24,3263	20763 1	CADR	GOFLASHR
2011	REP	1			24,3264	1 3350 0	TCF	V97T
2012	REP	1			24,3265	1 3403 1	TCF	V97P
2013	REP	1			24,3266	1 3432 0	TCF	V97E
2014	REP	1			24,3267	1 3276 0	TCF	PASTERET
2015	REP	5	LAST	661	24,3270	3 2351 1	ENGREQST	CAP V06N40
2016	REP	171	LAST	661	24,3271	0 4555 0	TC	BANKCALL
2017	REP	14	LAST	661	24,3272	20763 1	CADR	GOFLASHR
2018	REP	1			24,3273	1 3320 1	TCF	V99T
2019	REP	1			24,3274	1 3326 1	TCF	V99P
2020	REP	1			24,3275	1 3312 0	TCF	V99E
2021	REP	1			24,3276	3 2352 1	PASTERET	CAP P40OK99
2022	REP	2	LAST	384	24,3277	0 5415 1	TCR	LINUS
2023	REP	64	LAST	661	24,3300	1 5112 1	TCF	ENDOFJOB
2024	REP	13	LAST	661	24,3301	31=145 0	NOFLASH	CAB NWORD1
2025	REP	172	LAST	661	24,3302	0 4555 0	TC	BANKCALL
2026	REP	1			24,3303	20616 1	CADR	REGODSP
2027	REP	5	LAST	639	24,3304	3 4753 1	E7SETTER	CAP EBANK7
2028	REP	31	LAST	639	24,3305	54 003 0	TS	EBANK
2029	REP	58	LAST	659	E7,1412		EBANK=	TIG
2030	REP	163	LAST	655	24,3306	0 0002 0	TC	Q
2031	REP	10	LAST	564	24,3307	3 4752 0	E6SETTER	CAP EBANK6
2032	REP	32	LAST	661	24,3310	54 003 0	TS	EBANK
2033	REP	43	LAST	661	E6,1466		EBANK=	DAPDATR1

DETERMINE FUNCTION, INDICATED BY NWORD1

SPS ENGINE-ON-ENABLE V99 FLASH
SPS ENGINE-FAILED V97 FLASH

LINUS MAKES IT A REDO, INHINT OK
TERMINATE
PROCEED
ENTER

LINUS MAKES IT A REDO, INHINT OK
TERMINATE
PROCEED
ENTER

IMMED RETURN - SET UP V99 OR V97

DISPLAY NWORD1 NORMALLY

SET UP EBANK6

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2034 REP 164 LAST 661 -24,3311 0 0002 0 TC Q
20345 REP 44 LAST 661 E6,1466 EBANK= DAPDATR1
2035 REP 19 LAST 657 24,3312 0 5261 1 V99E TC 2PHSCHNG
2036 24,3313 00006 1 OCT 00006
2037 24,3314 05024 1 OCT 05024
20372 24,3315 27000 1 OCT 27000
2038 REP 3 LAST 654 24,3316 0 3002 0 V99EJOB TCR TVCZAP -1
2039 REP 2 LAST 642 24,3317 1 2163 0 TCP P40RCS

20392 REP 45 LAST 662 E6,1466 EBANK= DAPDATR1
2040 REP 20 LAST 662 24,3320 0 5261 1 V99T TC 2PHSCHNG
2041 24,3321 00006 1 OCT 00006
2042 24,3322 05024 1 OCT 05024
20422 24,3323 27000 1 OCT 27000
2043 REP 4 LAST 662 24,3324 0 3002 0 V99TJOB TCR TVCZAP -1
2044 REP 5 LAST 643 24,3325 1 2204 1 TCP POST41
2045 24,3326 0 0004 0 V99P INHINT
2046 REP 8 LAST 659 24,3327 30 103 0 CAE FLAGWRD7
2047 REP 24 LAST 651 24,3330 7 4677 1 MASK BIT12
2048 REP 154 LAST 659 24,3331 10 000 0 CCS A
20485 REP 1 24,3332 1 3345 1 TCP V99P/TIG

20486 REP 25 LAST 662 24,3333 3 4677 0 ASTNV99P CAP BIT12
20487 REP 9 LAST 662 24,3334 26 103 1 ADS FLAGWRD7
2051 REP 10 LAST 662 24,3335 30 103 0 CAE FLAGWRD7
2052 REP 28 LAST 657 24,3336 7 4676 0 MASK BIT13
2053 24,3337 0 0006 1 EXTEND
2054 REP 2 LAST 662 24,3340 1 3345 1 BZP V99P/TIG

2055 REP 42 LAST 655 24,3341 3 4712 1 ENDV99P1 CAP BIT1
2056 REP 33 LAST 659 24,3342 0 5140 1 TC WAITLIST
2057 REP 46 LAST 662 E6,1466 EBANK= DAPDATR1
2058 REP 2 LAST 210 24,3343 02552 1 ZCADR IGNITION
2058 24,3344 50066 1
20605 REP 6 LAST 661 24,3345 3 2351 1 V99P/TIG CAP V06N40
20606 REP 14 LAST 661 24,3346 55=145 1 TS NWORD1
2061 REP 85 LAST 661 24,3347 1 5112 1 ENDV99P TCP ENDOPJOB

20665 REP 6 LAST 654 E6,1474 EBANK= CSMASS
2067 REP 21 LAST 662 24,3350 0 5261 1 V97T TC 2PHSCHNG
2068 24,3351 00006 1 OCT 00006
2069 24,3352 40674 0 OCT 40674
2070 REP 43 LAST 662 24,3353 3 4712 1 CAP BIT1
2071 REP 4 LAST 429 24,3354 0 5130 0 TC TWIDDLE
2072 REP 2 LAST 210 24,3355 03357 0 ADRES V97TTASK
2073 REP 86 LAST 662 24,3356 1 5112 1 TCP ENDOPJOB
    
```

KILL PRE40.6/CLOCKTASK PROTECTION
C, PRIORITY NEXT, JOB BELOW

WIPE OUT TVC, CLOCKTASK
V16N85 POST-BURN OPERATIONS

(ENTRY FROM V97T FLOW TOO)
KILL PRE40.6/CLOCKTASK PROTECTION
C, PRIORITY NEXT, JOB BELOW

WIPE OUT TVC, CLOCKTASK
AVEGEXIT, SETMAXDB, GOTOPOOH

CHECK ASIN FLAG FOR PRIOR V99P

YES, THIS MUST BE A RESTART ENTRY

SET ASIN FLAG

CHECK IGN FLAG FOR TIG-0 ARRIVAL

NO, CLEAR THE V99 AND WAIT FOR TIG-0

TIG-0 HAS COME ALREADY
SET UP IGNITION HERE

CLEAR THE V99 FLASH AND WAIT FOR TIG-0

KILL GROUP 6 (CLOCKTASK)
A, 4.67 = V97TTASK (-0 CS), TRACE NOW

KEEP EBANK6 FOR MASSES, SPSOFF, ETC.

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2074	REP	7	LAST	662	E6,1474		EBANK= CSNMASS
2075	REP	134	LAST	657	24,3357	3 4714 1	V97TTASK CAP ZERO
2076	REP	15	LAST	662	24,3360	55=145 1	TS NVWORD1
2077	REP	1			24,3361	3 2361 1	CAP 3NDOT
2078	REP	8	LAST	663	24,3362	6 1474 1	AD CSNMASS
2079	REP	5	LAST	654	24,3363	55=662 0	TS MASSTMP
2080	REP	50	LAST	659	24,3364	0 5301 0	TC PHASCHNG
2081					24,3365	05014 1	OCT 05014
2082					24,3366	77777 0	DEC -0
2083	REP	3	LAST	653	24,3367	0 2737 0	TCR SPSOFF
2084	REP	51	LAST	663	24,3370	0 5301 0	TC PHASCHNG
2085					24,3371	00714 0	OCT 00714
2086	REP	4	LAST	654	24,3372	0 5156 0	TC FIXDELAY
2087					24,3373	00372 1	DEC 250
2088	REP	47	LAST	662	E6,1466		EBANK= DAPDATR1
2089	REP	27	LAST	654	24,3374	0 4633 0	V97TRCS TC IBKCALL
2090	REP	3	LAST	654	24,3375	42010 0	CADR RCDAPON
2091	REP	4	LAST	659	24,3376	3 7664 1	CAP PRI027
2092	REP	23	LAST	659	24,3377	0 5027 1	TC NOVAC
2093	REP	46	LAST	663	E6,1466		EBANK= DAPDATR1
2094	REP	2	LAST	661	24,3400	03320 0	2CADR V99T
2094					24,3401	50066 1	
2095	REP	35	LAST	659	24,3402	1 5213 0	ENDV97T TCP TASKOVER
2096	REP	4	LAST	654	E6,1444		EBANK= V97VCNTR
2097	REP	52	LAST	663	24,3403	0 5301 0	V97P TC PHASCHNG
2098					24,3404	40734 0	OCT 40734
2099	REP	44	LAST	662	24,3405	3 4712 1	CAP BIT1
2100	REP	5	LAST	662	24,3406	0 5130 0	TC TWIDDLE
2101	REP	2	LAST	210	24,3407	03411 0	ADRES V97PTASK
2102	REP	67	LAST	662	24,3410	1 5112 1	TCP ENDOPJOB
2103	REP	5	LAST	663	E6,1444		EBANK= V97VCNTR
2104	REP	6	LAST	663	24,3411	31=444 1	V97PTASK CAE V97VCNTR
2105	REP	2	LAST	103	24,3412	55=653 1	TS VCNTR
A2106							
A2107							
2108	REP	7	LAST	662	24,3413	3 2351 1	CAP V06N40
2109	REP	16	LAST	663	24,3414	55=145 1	TS NVWORD1
2110	REP	41	LAST	644	24,3415	0 5435 0	TC UPPLAG
2111	REP	1			24,3416	00030 1	ADRES IDLEFAIL
2112	REP	42	LAST	663	24,3417	0 5435 0	TC UPPLAG
2113	REP	1			24,3420	00042 1	ADRES STEERSW
2114	REP	53	LAST	663	24,3421	0 5301 0	TC PHASCHNG
2115					24,3422	00134 1	OCT 00134
2116	REP	5	LAST	663	24,3423	0 5156 0	TC FIXDELAY
2117					24,3424	00310 0	DEC 200

DISABLE CLOCKJOB

 3 SECONDS OF MDOT (2-4 SEC ENGFAIL
DETECTION) NOT LOST BECAUSE THRUST
FAILED. COPYCYCLE FOR MASSBACK

 C, DELTAT NEXT, TASK BELOW, IN
-0 CS

SHUTDOWN SPS ENGINE, MASS UPDATE, ETC.

 A, 4.71 = V97TRCS (250 CS), THASE OLD
DELAY 2.5 SECONDS FOR (POSSIBLE) TAIL-
OFF (FALSE THRUST-LOSS)

 RCS DAP IN 0.6 SEC, SETTING T5 BITS TO
KILL TVCEXEC/TVCROLIDAP STARTS
SET UP V99T FOR TVCZAP AND POST41 (SET-
MAXDB AND GOTOPOCH)
EBANK6 FOR SETMAXDB IN POST41

A, 4.73 = V97PTASK (-0 CS), THASE NOW

 GET MASS UPDATES (TVCEXEC) GOING AGAIN
(ERRORS IF PLASE THRUST-LOSS AND/OR
POOR SYNCH OF MANUAL ENGINE-ON AND
THE VERB 97 PROCEED)
REDISPLAY V06N40

 SET IDLEFAIL TO ALLOW R41-BYPASS, IN
CASE OF UNFAVORABLE S40.6 SYNCH
SET STEERSW TO RE-ENABLE STEERING

 A, 4.13 = R40ENABL (200 CS), THASE OLD
WAIT 2 SECONDS, THEN

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2118	REP	5	LAST	622	E7,1777		EBANK= WHOCARES
2119	REP	43	LAST	657	24,3425	0 5447 0	R40ENABL TC DOWNFLAG
2120	REP	2	LAST	663	24,3428	00030 1	ADRES IDLEFAIL
2121	REP	54	LAST	663	24,3427	0 5301 0	TC PHASCHNG
2122					24,3430	00004 0	OCT 00004
2123	REP	36	LAST	663	24,3431	1 5213 0	ENDV97P TCP TASKOVER
2124	REP	6	LAST	664	E7,1777		EBANK= WHOCARES
2125	REP	55	LAST	664	24,3432	0 5301 0	V97E TC PHASCHNG
2126					24,3433	40534 1	OCT 40534
2127	REP	45	LAST	663	24,3434	3 4712 1	CAP BIT1
2128	REP	34	LAST	662	24,3435	0 5140 1	TC WAITLIST
2129	REP	59	LAST	661	E7,1412		EBANK= TIG
2130	REP	2	LAST	210	24,3438	03441 0	ZCADR V97ETASK
2130					24,3437	50067 0	
2131	REP	66	LAST	663	24,3440	1 5112 1	TCP ENDOPJOB
2132	REP	60	LAST	664	E7,1412		EBANK= TIG
2133	REP	5	LAST	233	24,3441	4 4112 0	V97ETASK CS OCT24
2134	REP	61	LAST	664	24,3442	55=412 0	TS TIG
2135	REP	6	LAST	663	24,3443	3 2351 1	CAP V06N40
2136	REP	17	LAST	663	24,3444	55=145 1	TS NVWORD1
2137	REP	3	LAST	653	24,3445	0 3307 0	TCR E6SETTER
2138	REP	9	LAST	663	E6,1474		EBANK= CSMMASS
2139	REP	2	LAST	663	24,3446	3 2361 1	CAP 3MDOT
2140	REP	10	LAST	664	24,3447	6 1474 1	AD CSMMASS
2141	REP	6	LAST	663	24,3450	55=682 0	TS MASSIMP
2142	REP	56	LAST	664	24,3451	0 5301 0	TC PHASCHNG
2143					24,3452	00754 1	OCT 00754
2145	REP	4	LAST	663	24,3453	0 2737 0	SPSOPF97 TCR SPSOPF
2146	REP	57	LAST	664	24,3454	0 5301 0	TC PHASCHNG
2147					24,3455	00114 0	OCT 00114
2148	REP	6	LAST	663	24,3456	0 5158 0	TC FIXDELAY
2149					24,3457	00372 1	DEC 250
2150	REP	49	LAST	663	E6,1466		EBANK= DAPDTRI
2151	REP	46	LAST	664	24,3460	3 4712 1	V97E40.6 CAP BIT1
2152	REP	35	LAST	664	24,3461	0 5140 1	TC WAITLIST
2153	REP	2	LAST	641	E6,1447		EBANK= CNTR
2154	REP	2	LAST	212	24,3462	02040 1	ZCADR PRE40.6
2154					24,3463	40066 0	
2155	REP	26	LAST	663	24,3464	0 4633 0	TC IBKCALL
2156	REP	4	LAST	663	24,3465	42010 0	CADR RCDAPON
A2157							
2158	REP	22	LAST	662	24,3466	0 5261 1	TC 2PHSCHNG
2159					24,3467	00026 0	OCT 00026
2160					24,3470	05014 1	OCT 05014
21602					24,3471	77777 0	DEC -0

RE-ENABLE R40 BY CLEARING IDLEFAIL

KILL GROUP 4

A, 4.53 = V97ETASK (-0 CS), THASE NOW

FORCE R1 OF V06N40 TO READ 59X59

REDISPLAY V06N40

RETURN TO EBANK6 FOR REST OF V97ETASK

3 SECONDS OF MDOT (2-4 SEC ENGFAIL
DETECTION) NOT LOST BECAUSE THRUST
FAILED....COPYCYCLE FOR MASSBACK

A, 4.75 = SPSOPF97 (-0 CS), THASE OLD

A, 4.11 = V97E40.6 (250 CS), THASE OLD
DELAY 2.5 SECONDS FOR (POSSIBLE) TAIL-
OFF (FALSE THRUST-LOSS)

USE S40.6 RESTART ENTRY TO TRIM ENGINE

RCS DAP IN 0.6SEC, SETTING TS BITS TO
KILL TVCEXEC/TVCRLLDAP STARTS.
LEAVE NARROW DEADBAND FOR REIGNITE

A, 6.2 = PRE40.6 (-0CS), CLQKTASK (1SEC)
C, DELTAT NEXT, TASK BELOW, IN
-0 CS

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CLEAR ASTINFLAG AND SET IGNFLAG FOR
IMMEDIATE V99 RESPONSE

DELAY TO ALLOW TIME FOR PRE40.6

CAUSE V99 TO FLASH

A, 4.77 = TIG-0 (-0CS) TRASE FOR PREPTVC
A, 3.3 = S40.13 (PRIO 20)
SET UP TIMEBURN

WAIT FOR CLOCKJOB (IMMEDIATE) REACTION
TO FLASHING V99 RESPONSE

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R2207 IF AIMPOINT STEERING
R2208 IF AIMPT STEER
R2209 TIG TIME OF IGNITION DP B28CS
R2210 RTARG POSITION TARGET TIME VECTOR B29M
R2211 CSTEER = ECSTEER(OR 0) DP B1
R2212 TPASS4 - TIME OF ARRIVAL AT AIMPOINT
R2213 .OUTPUT
R2214 UT 1/2 UNIT VECTOR ALIGNED WITH THRUST DIRECTION IN REF COOR
R2215 VOTIG INITIAL VALUE OF VELOCITY
R2216 TO BE GAINED (INERT. COORD.) VECTOR B7M/CS
R2217 DELVLVC VOTIG IN LOC. VERT. COORDS. B7M/CS
R2218 F NOMINAL THRUST FOR ENG USED FOR S40.13 DP B7 M-NEWT
R2219 BDT V REQUIRED AT TIG -V REQUIRED AT (TIG-2SEC)
R2220 -ODT FOR S40.13 VECT B7M/CS
R2221 RTIG CALC IN S40.1B(AIMPT) FOR S40.2,3 VECTOR B29M
R2222 POSITION AT TIME OF IGNITION
R2223 DEBRIS QTEMP1
R2224 MPAC,OPRET
R2225 PUSHLIST
R2226 RIX2,RIX1
2227 14,2002 BANK 14
2228 REF 1 16,2000 SETLOC P40S1
2229 16,2000 BANK
2230 REF 1 COUNT 16/S40.1
2231 16,2000 77214 0 S40.1 SET VLOAD
2232 REF 2 LAST 656 16,2001 01070 1 FIRSTFLG
2233 REF 1 16,2002 11456 0 LOGZEROS
2234 REF 3 LAST 656 16,2003 03705 0 STORE RDT
2235 16,2004 43020 1 STO BOP
2236 REF 6 LAST 633 16,2005 03657 0 QTEMP
2237 REF 7 LAST 655 16,2006 01347 0 XDELVFLG
2238 REF 1 16,2007 34073 1 S40.1B LAMBERT
2239 16,2010 77201 1 SETPD VLOAD EXTERNAL DELTA V
2240 16,2011 00001 0 0
2241 REF 5 LAST 631 16,2012 03640 0 VTIG
2242 REF 11 LAST 656 16,2013 03576 0 STORE VINIT
2243 16,2014 53435 0 VXV UNIT
2244 REF 6 LAST 632 16,2015 03632 0 RTIG
2245 REF 2 LAST 122 16,2016 27713 1 STOVL UT UP IN UT
2246 REF 7 LAST 666 16,2017 03632 0 RTIG
2247 REF 12 LAST 656 16,2020 03570 0 STORE RINIT
2248 16,2021 85236 0 VSO PDDL
2249 16,2022 00045 0 36D
2250 16,2023 56205 0 DMP DOV
2251 REF 1 16,2024 34127 1 DMP THETACON
2252 16,2025 41205 0 DMP
2253 REF 3 LAST 121 16,2026 03654 0 DELVSAR
2254 REF 2 LAST 100 16,2027 03076 0 WEIGHT/G

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2255				18,2030	77671 1
2256	RESP	3	LAST	640	18,2031 03727 0
2257					18,2032 24017 1
2258	RESP	9	LAST	631	18,2033 03646 0
2259					18,2034 74241 0
2260	RESP	3	LAST	666	18,2035 03713 1
2261	RESP	4	LAST	667	18,2036 03713 1
2262					18,2037 41552 0
2263					18,2040 65245 1
2264	RESP	10	LAST	667	18,2041 03646 0
2265					18,2042 00017 1
2266					18,2043 63356 1
2267					18,2044 00007 0
2268					18,2045 53435 0
2269	RESP	5	LAST	667	18,2046 03713 1
2270					18,2047 45561 1
2271	RESP	6	LAST	641	18,2050 50056 1
2272					18,2051 65256 0
2273					18,2052 00017 1
2274					18,2053 74346 0
2275					18,2054 74255 0
2276	RESP	7	LAST	667	18,2055 03721 0
2277					18,2056 00045 0
2278					18,2057 53352 0
2279					18,2060 77626 0
2280	RESP	6	LAST	667	18,2061 74056 1
2281					18,2062 77656 1
2282	RESP	6	LAST	667	18,2063 27713 1
2283	RESP	9	LAST	667	18,2064 03721 0
2284					18,2065 43006 0
2285	RESP	9	LAST	639	18,2066 01072 0
2286					18,2067 77624 1
2287	RESP	2	LAST	633	18,2070 10653 0
2288					18,2071 77650 1
2289	RESP	9	LAST	666	18,2072 03657 0
2290					18,2073 45345 1
2291	RESP	62	LAST	664	18,2074 03413 1
2292	RESP	1			18,2075 36001 0
2293	RESP	35	LAST	642	18,2076 14041 1
2294	RESP	10	LAST	656	18,2077 03656 1
2295					18,2100 77625 0
2296	RESP	36	LAST	667	18,2101 00041 1
2297	RESP	10	LAST	656	18,2102 37423 0
2298	RESP	2	LAST	632	18,2103 61663 0
2299					18,2104 77775 1
2300	RESP	13	LAST	632	18,2105 03612 1
2301	RESP	7	LAST	667	18,2106 17713 1
2302	RESP	63	LAST	667	18,2107 03413 1

DOV	P
STOVL	14D DELVSIN
DOT	VXSC UT UT
VSL2	PUSH
BVSJ	PDDL DELVSIN 14D
SIN	PDDL 6D
VXV	UNIT UT
VXSC	STADR
STOVL	VGFIG
UNIT	PDDL 14D
COS	VXSC
VAD	VXSC VGFIG 36D
VSL2	VAD
STADR	VGFIG
STORE	VGFIG
UNIT	
STOVL	UT VGFIG
PUSH	SET AVFLAG
CALL	
GOTO	MIDGIM
DLOAD	QTEMP DSU TIG
STOVL	TWOOT TDEC1 TPASS4
DSU	
STCALL	TDEC1 DELTA4 AGAIN
VLOAD	
STOVL	VIPRIME UT TIG

(DELTA V UP) UP SCALED AT 2(+7) P.D.L. 0
DELTA VP SCALED AT 2(+7) P.D.L. 6

UNIT(VXUP) SIN(THETA) IN VGFIG
UNIT(DELTA VP) IN P.D.L. 6

VG IGNITION SCALED AT 2(+7)M/CS

THRUST DIRECTION SCALED AT 2(+1)

VGFIG IN LV COOR AT 2(+7)M/CS IN DELVLC

LAMBERT

S40.1B



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2303	REP	37	LAST	667	16,2110	00041 1			
2304					16,2111	77621 1	STORE	TDEC1	
2305	REP	11	LAST	667	16,2112	03656 1	EDSU		
2306	REP	11	LAST	667	16,2113	37423 0		TPASS4	
2307	REP	3	LAST	667	16,2114	61663 0	STCALL	DELLT4	
2308					16,2115	41575 0		AGAIN	
2309	REP	16	LAST	633	16,2116	03646 0	VLOAD	PUSH	
2310	REP	10	LAST	667	16,2117	03721 0		DELVEET3	
2311					16,2120	45014 0	STORE	VTIG	
2312	REP	10	LAST	667	16,2121	01072 0	SET	CALL	
2313	REP	3	LAST	667	16,2122	10653 0		AVFLAG	
2314					16,2123	52001 1		MIDGIM	
2315					16,2124	00001 0	SETPD	GOTO	
2316	REP	1			16,2125	61716 0		0	
								CALCUT	
2317					16,2126	00024 1	THETACN	2DEC	.31830969 B-8
2317					16,2127	13714 1			
2318	REP	1			30,2000		SETLOC	P4083	
2319					30,3657		BANK		
2320	REP	1					CQNT	24/S40.1	
2321					30,3657	04000 0	EP4(45)H	2DEC	.125
2321					30,3660	00000 1			
2322					30,3661	00707 1	EP4(10)H	2DEC	.027777777
2322					30,3662	03434 1			
2323					30,3663	45020 1	AGAIN	STO	CALL
2324	REP	5	LAST	656	30,3664	03730 0			OTEMP1
2325	REP	6	LAST	630	30,3665	27022 1			THISPREC
2326					30,3666	66134 1	SXA,2	SXA,1	
2327	REP	12	LAST	630	30,3667	03746 1		RTX2	
2328	REP	10	LAST	631	30,3670	03745 1		RTX1	
2329					30,3671	77775 1	VLOAD		
2330	REP	21	LAST	631	30,3672	00001 0		RATT	
2331	REP	6	LAST	666	30,3673	03632 0	STORE	RTIG	
2332	REP	13	LAST	666	30,3674	27570 0	STOVL	RINIT	
2333	REP	17	LAST	630	30,3675	00007 0		VATT	
2334	REP	6	LAST	666	30,3676	03640 0	STORE	VTIG	
2335	REP	12	LAST	666	30,3677	03576 0	STORE	VINIT	
2336					30,3700	67201 0	SETPD	SLOAD	
2337					30,3701	00001 0		0	
2336	REP	16	LAST	657	30,3702	15332 1		H16ZEROS	
2339					30,3703	43125 0	PDDL	RQN	
2340	REP	1			30,3704	21660 1		EP4(45)H	
2341	REP	4	LAST	628	30,3705	03705 0		NORMSW	
2342					30,3706	61711 1		+3	
2343					30,3707	77745 1	DLOAD		
2344	REP	1			30,3710	21662 0		EP4(10)H	
2345					30,3711	45006 0	PUSH	CALL	
2346	REP	3	LAST	545	30,3712	22000 1		INITVEL	



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2347			30,3713	52001 1	SETPD	GOTO	
2348			30,3714	00001 0		0	
2349	REP	6	LAST	668		QTEMP1	
2350			30,3715	03730 0	CALCUT	VLOAD	CALL
2351	REP	9	LAST	668		RTIG	
2352	REP	2	LAST	528		CALCGRV	QDEL/TAT IN MPAC AT 2(+7)M/CS
2353			30,3721	70372 0	VSL1	V/SC	
2354	REP	1				200CS	G AT 2(-5) M/CS.CS
2355			30,3722	21761 1	PDVL	VSU	
2356	REP	14	LAST	667		VIPRIME	
2357	REP	8	LAST	667		UT	
2358			30,3728	52341 0	V/SC	VSU	
2359	REP	2	LAST	689		200CS	
2360			30,3730	72561 0	VXSC	VSL2	
2361	REP	5	LAST	644		CSTEER	
2362			30,3732	24015 0	STOVL	12D	B.C SCALED AT 2(-5) PDL 12D
2363	REP	11	LAST	668		VTIG	
2364			30,3734	41456 0	UNIT	PUSH	UG PDL 0 SCALED AT 2(+1)
2365			30,3735	74241 0	DOT	VXSC	
2366			30,3736	00015 0		12D	
2367			30,3737	00001 0		0	
2368			30,3740	51352 1	VSL2	BVSU	
2369			30,3741	00015 0		12D	
2370			30,3742	14015 0	STOVL	12D	Q PDL 12D SCALED AT 2(-5)
2371	REP	4	LAST	687		P	
2372			30,3744	56261 1	SRR	DDV	
2373			30,3745	21605 1		4	
2374	REP	3	LAST	666		WEIGHT/G	
2375			30,3747	63316 0	DSO	PDVL	F/MASS SQUARED PDL 6 AT 2(-10)M/(CS.CS)
2376			30,3750	00015 0		12D	
2377			30,3751	77636 1	VSO		
2378			30,3752	75421 1	BDSU	SORT	
2379			30,3753	76561 1	VXSC	VSL1	
2380			30,3754	53455 0	VAD	UNIT	
2381			30,3755	00015 0		12D	
2382	REP	9	LAST	889	STCALL	UT	
2383	REP	10	LAST	887		QTEMP	
2384			30,3760	01440 0	2DEC	200 B-12	
2384			30,3761	00000 1			

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P2385 PROGRAM DESCRIPTION S40.2,3 DATE 15,NOV,66
R2386 MOD NO 2 LOG SECTION P40-P47
R2387 MOD BY ZELDIN
R2388 FUNCTIONAL DESCRIPTION
R2389 COMPUTE GIMBAL ANGLES IF THRUSTING OCCURRED WITH PRESENT IMU
R2390 ORIENTATION, WINGS LEVEL SPACECRAFT, HEADS UP
R2391 COMPUTE X AXIS OF ENGINE BELL
R2392 COMPUTE PREFERRED IMU ORIENTATION(XSCREF)
R2393 FOR THIS CALCULATION, ASSUME X AXIS OF SC ALONG UT INITIALLY,
R2394 YSC=UNIT(XCR), ZSC=UNIT(XC(XCR)) AND ROTATE ENGINE BELL ALONG UT
R2395 NEW SC AXES WILL BE APPROX. WINGS LEVEL AND NEW SC AXES IN REF.
R2396 COORDS. WILL BE PREFERRED IMU ORIENTATION.
R2397 COMPUTE DESIRED THRUST DIRECTION IN SM COORDS.
R2398 CALLING SEQUENCE
R2399 L CALL
R2400 L+1 S40.2,3
R2401 NORMAL EXIT MODE
R2402 AT L+2 OF CALLING SEQUENCE (GOTO L+2)
R2403 SUBROUTINES CALLED
R2404 CALCOA
R2405 ALARM OR ABORT MODES
R2406 NONE
R2407 ERASABLE INITIALIZATION REQUIRED
R2408 PACTOPF TOTAL PITCH TRIM ANGLE SP AT 1.0795111 REV.
R2409 YACTOPF TOTAL YAW TRIM ANGLE SP AT 1.0795111 REV.
R2410 UT DESIRED THRUST DIRECTION VECT.B2M/(CS.CS)
R2411 RTIG POSITION AT TIME OF IGNITION VECT. B29M
R2412 ENG2FLAG ON=RCS OFF=SPS
R2413 OUTPUT
R2414 SCAXIS UNIT VECT. ALIGNED WITH ENG BELL IN SC COOR B1
R2415 XSCREF UNIT VECTORS ALIGNED WITH PREFERRED IMU B1
R2416 YSCREF
R2417 ZSCREF
R2418 GIMBAL ANGLES IN THETAD
R2419 POINTVSM UNIT VECT ALONG DESIRED THRUST DIRECTION IN SM B1
R2420 DEBRIS
R2421 PUSHLIST,OPRET,MPAC
R2422 QTEMP TEMP. ERASABLE
2423 24,3512 BANK 24
2424 REF 2 LAST 640 24,2000 SETLOC P40S
2425 24,3512 BANK
2426 REF 1 COUNT* SS/S40.2
2427 24,3512 64375 1 S40.2,3 VLOAD MXV
2428 REF 10 LAST 669 24,3513 03713 1 UT
2429 REF 18 LAST 612 24,3514 01736 1 REFSMAT
2430 24,3515 44172 0 VSLI STO
2431 REF 11 LAST 669 24,3516 03657 0 QTEMP
2432 REF 5 LAST 612 24,3517 03357 0 STORE POINTVSM THRUST IN SM AT 2
2433 24,3520 43001 1 SETPD BCN
2434 24,3521 00001 0

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2435	REP	3	LAST	644	24,3522	00704 1	ENG2FLAG	
2436	REP	1			24,3523	51633 0	S40.2,38	
2437					24,3524	77745 1	DLOAD	
2438	REP	19	LAST	668	24,3525	15332 1	HI6ZEROS	
2439					24,3526	67206 1	PUSH	SLOAD ZERO PDL 0
2440	REP	3	LAST	655	24,3527	03027 1	YACTOFF	
2441					24,3530	72405 0	DMP	SL1
2442	REP	1			24,3531	11672 1	TRIMSCAL	
2443					24,3532	41415 1	DAD	PUSH
2444	REP	1			24,3533	11674 1	YBIAS	
2445					24,3534	65346 0	COS	PDDL COS(Y +Y0) PDL 2
2446					24,3535	41556 1	SIN	PUSH SIN(Y +Y0) PDL 4
2447					24,3536	77735 0	SLOAD	
2448	REP	13	LAST	655	24,3537	03026 0	PACTOFF	
2449					24,3540	72405 0	DMP	SL1
2450	REP	2	LAST	671	24,3541	11672 1	TRIMSCAL	
2451					24,3542	41415 1	DAD	PUSH
2452	REP	1			24,3543	11676 0	PBIAS	
2453					24,3544	65346 0	COS	PDDL COS(P +P0) PDL 6
2454					24,3545	41556 1	SIN	PUSH SIN(P +P0) PDL 8D
2455	REP	1			24,3546	14323 0	STODL	ZSCREF SIN(P+P0)
2456					24,3547	00007 0	6	
2457					24,3550	72405 0	DMP	SL1
2458					24,3551	00005 1	4	
2459					24,3552	65276 1	DCOMP	PDDL -SIN(Y+Y0)COS(P+P0) PDL 10
2460					24,3553	00007 0	6	
2461					24,3554	72405 0	DMP	SL1
2462					24,3555	00003 1	2	
2463					24,3556	77666 1	VDEF	
2464	REP	1			24,3557	14307 0	STODL	XSCREF PD POINTER AT 6 NEW SC X AXIS SCALED AT
2465	REP	2	LAST	671	24,3560	00323 0	ZSCREF	
2466					24,3561	72405 0	DMP	SL1
2467					24,3562	00005 1	4	
2468					24,3563	41325 0	PDDL	DMP
2469	REP	3	LAST	671	24,3564	00323 0	ZSCREF	
2470					24,3565	00003 1	2	
2471					24,3566	57552 1	SL1	DCOMP
2472					24,3567	77666 1	VDEF	
2473	REP	4	LAST	671	24,3570	14323 0	STODL	ZSCREF PD POINTER AT 4 NEW SCZ AXIS SCALED AT 2
2474					24,3571	77666 1	VDEF	
2475	REP	1			24,3572	14315 0	STODL	YSCREF PD POINTER AT 0 NEW SC Y AXIS SCALED AT 2
2476	REP	5	LAST	671	24,3573	00323 0	ZSCREF	
2477					24,3574	65325 0	PDDL	PDDL
2478	REP	2	LAST	671	24,3575	00315 0	YSCREF	
2479	REP	2	LAST	671	24,3576	00307 0	XSCREF	
2480					24,3577	77666 1	VDEF	



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2461 REP 15 LAST 612 24,3600 27351 0
2462 REP 11 LAST 670 24,3601 03713 1
2463 24,3602 53515 0
2464 REP 10 LAST 669 24,3603 03632 0
2465 24,3604 57435 1
2466 24,3605 00001 0
2467 24,3606 41456 0
2468 24,3607 77624 1
2469 REP 1 24,3610 51652 1
2490 24,3611 57435 1
2491 24,3612 00001 0
2492 24,3613 63372 1
2493 REP 3 LAST 671 24,3614 00307 0
2494 24,3615 76505 0
2495 24,3616 00001 0
2496 REP 4 LAST 672 24,3617 24307 0
2497 REP 3 LAST 671 24,3620 00315 0
2498 24,3621 76505 0
2499 24,3622 00001 0
2500 REP 4 LAST 672 24,3623 24315 0
2501 REP 6 LAST 671 24,3624 00323 0
2502 24,3625 76505 0
2503 24,3626 00001 0
2504 REP 7 LAST 672 24,3627 00323 0
2505 24,3630 52001 1
2506 24,3631 00001 0
2507 REP 12 LAST 670 24,3632 03657 0
2508 24,3633 77775 1
2509 REP 6 LAST 567 24,3634 15330 0
2510 REP 16 LAST 672 24,3635 27351 0
2511 REP 12 LAST 672 24,3636 03713 1
2512 REP 5 LAST 672 24,3637 00307 0
2513 24,3640 53435 0
2514 REP 11 LAST 672 24,3641 03632 0
2515 24,3642 34007 1
2516 REP 2 LAST 672 24,3643 51652 1
2517 REP 5 LAST 672 24,3644 00315 0
2518 24,3645 57435 1
2519 REP 6 LAST 672 24,3646 00307 0
2520 24,3647 77772 0
2531 REP 8 LAST 672 24,3650 34323 1
2532 REP 13 LAST 672 24,3651 03657 0
2533 24,3652 46145 0
2534 24,3653 00045 0
2535 REP 1 24,3654 51657 1
2536 24,3655 43575 1
2537 24,3656 00007 0
2538 24,3657 53575 0
2539 REP 12 LAST 672 24,3660 03632 0
2540 24,3661 53515 0

STOVL SCAXIS
UT
PDVL UNIT
RTIG
VXV VCOMP
0
UNIT PUSH
CALL

TSTRUT
VXV VCOMP
0

VSL1 PDVL
XSCREF
VXM VSL1
0

STOVL XSCREF
YSCREF
VXM VSL1
0

STOVL YSCREF
ZSCREF
VXM VSL1
0

STORE ZSCREF
SETPD GOTO
0

QTEMP
S40.2,38 VLOAD
UNITX
SCAXIS
UT

STORE XSCREF
VXV UNIT
RTIG

STCALL 6D
TSTRUT
STORE YSCREF
VXV VCOMP
XSCREF

VSL1
STCALL ZSCREF
QTEMP

TSTRUT DLOAD RHIZ
36D
BADVCTOR
VLOAD RVO
6D

BADVCTOR VLOAD UNIT
RTIG
PDVL UNIT

ENGINE BELL SCALED AT 2

2 RP/SC IN PDL 12D

X OF PREP IMU, X OF SC IN REF COOR. AT 2

Y OF PREP IMU, Y OF SC IN REF COOR. AT 2

Z OF PREP IMU, Z OF SC IN REF COOR. AT 2

ZNB AXIS IN REF COOR



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2541	REF	7	LAST	668	24,3662	03640 0		VTIG
2542					24,3663	53322 1	VSR3	VAD
2543					24,3664	53435 0	VXV	UNIT
2544	REF	13	LAST	672	24,3665	03713 1		UT
2545					24,3666	77676 0	VCOMP	
2546					24,3667	00007 0	STORE	6D
2547					24,3670	77616 0	RVO	
2548					24,3671	21215 1	TRIMSCAL	2DEC 1.07975111 B-1
2548					24,3672	12215 1		
2549					24,3673	00053 1	YBIAS	2DEC +.00263868689 YAW MECH BIAS (+0.95 DEG, THRUST ON)
2549					24,3674	07423 0		
2550					24,3675	77636 1	PBIAS	2DEC -.00597222222 PITCH MECH BIAS (-2.15 DEG, THRUST ON)
2550					24,3676	44653 1		

A2551
R2552 PROGRAM DESCRIPTION S41.1 DATE 8DEC68
R2553 MOD NO1 LOG SECTION P40-P47
R2554 MOD BY ZELDIN
R2555 FUNCTIONAL DESCRIPTION
R2556 COMPUTE VELOCITY TO BE GAINED INITIALLY IN REF COORDS.
R2557 TO CONTROL COORDS.
R2558 CALLING SEQUENCE
R2559 L CALL
R2560 L+1 S41.1
R2561 NORMAL EXIT MODE
R2562 AT L +2 OF CALLING SEQUENCE
R2563 SUBROUTINES CALLED
R2564 CALCSMSC
R2565 CDUTRIG
R2566 ALARM OR ABORT MODES
R2567 NONE
R2568 ERASABLE INITIALIZATION REQUIRED
R2569 VG IN REF. COORD. PDL L POINTER AT L+5 .S41.1 WILL RETURN WITH
R2570 POINTER AT L (L MUST BE LESS THAN OR = TO 14D)
R2571 OUTPUT
R2572 MPAC CONTAINS VG IN CONTROL COORDS VECT. B7M/CS
R2573 DEBRIS+
R2574 QTEMP TEMP ERASABLE
R2575 OPRET
2576 REF 1 COUNT 22/S41.1

2577 REF 1 22,2000 SETLOC P40S5
2578 22,3426 BANK

2579 22,3426 45020 1 S41.1 STO CALL
2580 REF 14 LAST 672 22,3427 03657 0 QTEMP
2581 REF 5 LAST 585 22,3430 47432 1 CDUTRIG
2582 22,3431 77775 1 VLOAD
2583 22,3432 45121 1 MKV CALL
2584 REF 19 LAST 670 22,3433 01736 1 REFSMAT
2585 REF 3 LAST 585 22,3434 47577 1 *SNB*



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2586				22,3435	74321 1	MOV	VXSC
2587	REP	2	LAST	22,3436	05004 0		QUADROT
2588	REP	1		22,3437	05443 1		TENBNK14
2589				22,3440	52072 0	VSL5	GOTO
2590	REP	15	LAST	22,3441	03657 0		QTEMP
2591				22,3442	24000 1	TENBNK14	ZDEC
2591				22,3443	00000 1		10. B-4

VG IN CONTROL COORD IN MPAC SCALED AT
VG IN CONTROL COORDS. IN MPAC AT 2(+7)



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R2592 NAME S40.8 - CROSS PRODUCT STEERING
R2593 FUNCTION (1) UPDATES THE VELOCITY-TO-BE-GAINED VECTOR.
R2594 (2) GENERATES ANGULAR RATE STEERING COMMANDS FOR AUTOPILOT.
R2595 (3) ESTABLISHES ENGINE CUT-OFF SIGNALS AT APPROPRIATE TIMES.
R25952 (4) INITIATES THRUST-FAIL ROUTINE, R40
R2596 CALLING SEQ CALL S40.8
R2597 INPUT VGPREV - LAST VALUE OF THE VELOCITY-TO-BE-GAINED VECTOR
R2598 PRIOR TO UPDATING IN METERS/CS AT +7.
R2599 DELVREF - CHANGE IN VEHICLE VELOCITY SINCE LAST MEASUREMENT
R2600 IN METERS/CS AT +7.
R2601 BOT - EFFECT OF RATE OF CHANGE OF REQUIRED VELOCITY AND
R2602 GRAVITY DURING DT UPON VELOCITY-TO-BE-GAINED IN
R2603 METERS/CS AT +7.
R2604 CSTEER - A SCALAR OF THE STEERING LAW, SC.AT B+1, USED FOR
R2605 SPS AIMPOINT STEERING MANEUVERS
R2606 IDLEFAIL - A FLAG TO INHIBIT (IDLE) THE THRUST-FAIL ROUTINE
R2607 STEERSW - A SWITCH TO PRECLUDE NEEDLESS CONDUCT OF STEERING
R2608 REFSMAT, DAPDATR1, PIPTIME
R2609 EREPPRAC, ETOECAY, KPRIMEDT FOR TVC
R2614 OUTPUT TGOO - TIME REMAINING FOR ENGINE BURN IN CS AT +28
R2615 OMEGAC - DP VECTOR RATE COMMAND, SC.AT 1/(2TVCDT) REVS/SEC
R26152 VG, VGPREV, VGDISP, TGO, TIG, SCALED AS NOTED IN CODING
R26153 STEERSW, IMPULSW, NWORD1
R26154 REPPRAC, CNTR, VCNTR, VCNTRIMP FOR TVC (R40 INTERFACING)
R2616 DEBRIS OMEGAXC, +1
R2617 SUBROUTINES USED - *SMNB*, ALARM

2618	REF	2	LAST	666	16,2000	SETLOC	P40S1	
2619					16,2130	BANK		
2620	REF	50	LAST	664	E6,1466	EBANK=	DAPDATR1	
2621	REF	1				COUNT	16/S40.8	
2622					16,2130	44001 0	S40.8	
2623					16,2131	00001 0	SPBIT1	
2624	REF	16	LAST	674	16,2132	03657 0		
2625					16,2133	51375 1		
2626	REF	3	LAST	655	16,2134	03433 0		
2627	REF	4	LAST	666	16,2135	03705 0		
2628					16,2136	77655 1		
2629	REF	3	LAST	656	16,2137	03721 0		
2630	REF	3	LAST	122	16,2140	03460 0		
2631					16,2141	77646 0	ABVAL	
2632	REF	7	LAST	641	16,2142	03654 0	STORE	VGDISP
2633					16,2143	77776 1	EXIT	
2634	REF	56	LAST	664	16,2144	0 5301 0	TC	PHASCHNG
2635					16,2145	10035 0	OCT	10035
2636	REF	145	LAST	660	16,2146	0 6006 1	TC	INTPRET
2637					16,2147	77775 1	VLOAD	

CONSTRUCT DELVG, SC.AT B+7 M/CS

VELOCITY-TO-BE-GAINED, SC.AT B+7 M/CS

FOR DISPLAY PURPOSES

TYPE B RESTART BELOW AND 5.3 REREADAC

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2636	REF	4	LAST	675	16,2150	03480 0
2639	REF	4	LAST	675	16,2151	03721 0
2640					16,2152	77214 0
2641	REF	2	LAST	663	16,2153	01344 0
2642	REF	17	LAST	675	16,2154	03657 0
2643	REF	4	LAST	675	16,2155	03433 0
2644					16,2156	41448 1
2645					16,2157	41335 1
26453	REF	1			16,2160	01354 1
26454	REF	1			16,2161	36011 1
26456					16,2162	77621 1
2646					16,2163	77440 1
2647	REF	1			16,2164	40021 0
2648	REF	51	LAST	675	16,2165	31486 1
2649	REF	39	LAST	564	16,2166	7 4675 0
2650	REF	155	LAST	662	16,2167	10 000 0
2651	REF	47	LAST	664	16,2170	3 4712 1
2652	REF	156	LAST	676	16,2171	50 000 1
2653	REF	1			16,2172	31423 0
2654	REF	2	LAST	103	16,2173	554652 0
2655	REF	146	LAST	675	16,2174	0 6006 1
2656					16,2175	51375 1
2657	REF	5	LAST	676	16,2176	03433 0
2658	REF	5	LAST	675	16,2177	03705 0
2659					16,2200	77656 1
2660					16,2201	41441 0
2661	REF	5	LAST	676	16,2202	03480 0
2662					16,2203	56244 0
2663	REF	1			16,2204	40013 1
2664	REF	1			16,2205	36005 1
2665					16,2206	41215 1
2666	REF	1			16,2207	11454 1
2667					16,2210	70501 1
2668	REF	29	LAST	656	16,2211	00047 1
2669					16,2212	60325 0
2670					16,2213	00045 0
2671	REF	11	LAST	593	16,2214	00050 1
2672					16,2215	77665 1
2673					16,2216	53664 0
2674	REF	30	LAST	676	16,2217	00046 0
2675					16,2220	57607 1
2676					16,2221	41405 0
2677	REF	1			16,2222	36003 1
2678					16,2223	54335 0
2679	REF	1			16,2224	03016 0
2680					16,2225	20617 0
2681					16,2226	45421 1
2682	REF	15	LAST	665	16,2227	74347 1
2683					16,2230	77615 0

	VG	
STORE	VGPREV	
BOFF	VLOAD	
	STEERSW	SKIP TGO AND CROSS-PRODUCT
	QTEMP	
	DELVREF	
ABVAL	PUSH	CHECK FOR LOTHRUST
SLOAD	DMP	
	DVTHRESH	SC,AT B-2 M/CS
	DPB-9	
BDSU		
BNN	EXIT	
	LOTHRUST	
CAE	DAPDATR1	ENABLE TVCDAP CG TRACKING
MASK	BIT14	
CCS	A	
CAP	3IT1	
WONX	A	LM-OFF, LM-ON VALUE
CAE	EREPPRAC	
TS	REPPRAC	
TC	INTERPRET	
TGOALC	VLOAD	GET DELVG
	BVSU	
	DELVREF	
	BDT	
UNIT		
DOT	PUSH	(00D)
	VG	
BPL	DOV	ANGLE SHOULD BE GREATER THAN PI/2
	INCRSVG	DISPLAY ALARM IF NOT
	ZVEGHUST	
DAD	DMP	(DOT PRODUCT UP FROM 00D)
	LODPHALP	
NORM	SR1	
	X1	
PDDL	NORM	
	36D	(MAG DELVG)
	X2	
BDDV		
XSU,2	SL*	
	X1	
	0 -9D,2	
DMP	PUSH	(00D)
	-FOURDT	
SLOAD	SR	
	ETDECAY	ETDECAY SC,AT B+14 CS
	14D	
BDSU	STADR	
STORE	TGO	TIME TO GO IN CS. AT +26
DAD		



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2664	REF	7	LAST	656	16,2231	01205 1			PIPTIME
2685	REF	64	LAST	667	16,2232	17413 1	STODL		TIG
2666	REF	16	LAST	676	16,2233	03430 0			TGO
2687					16,2234	50025 0	DSU		RNN
2666	REF	1			16,2235	38007 0			FOURSEC
2689	REF	1			16,2236	40000 0			S40.81
2690					16,2237	74375 0	XPRODUCT	VLOAD	VXSC
2691	REF	6	LAST	676	16,2240	03705 0			EDT
2692	REF	6	LAST	669	16,2241	03703 0			CSTEER
2693					16,2242	52352 1	VSL2		VSU
2694	REF	6	LAST	676	16,2243	03433 0			DELAREP
2695					16,2244	63256 0	UNIT		PDVL
2696	REF	6	LAST	676	16,2245	03480 0			VG
2697					16,2246	47256 0	UNIT		VXV
2698					16,2247	45121 1	MXV		CALL
2699	REF	20	LAST	673	16,2250	01736 1			REFSMAT
2700	REF	4	LAST	673	16,2251	47577 1			*SNB*
2701					16,2252	77761 1	VXSC		
2702	REF	2	LAST	103	16,2253	03245 1			KPRIMEDT
2703	REF	5	LAST	101	16,2254	03126 1	OMEGACLC	STORE	OMEGAC
2704					16,2255	77650 1	GOTO		
2705	REF	16	LAST	676	16,2256	03657 0			QTEMP
2706	REF	1			17,2000		SETLOC	DAPS7	
2707					17,2000		BANK		
2708	REF	1					COUNT	17/S40.6	
2709					17,2000	00000 1	TWODT	2DEC	200.0 B-26
2709					17,2001	00310 0			2 SEC
2710					17,2002	77715 1	-FOURDT	2DEC	-600 B-18
2710					17,2003	77777 0			-4(200CS), SC.AT B+16CS (-4 FOR SCALING)
2711					17,2004	17602 0	2VEXHUST	2DEC	63.020792 B-7
2711					17,2005	25124 1			2(10336.0564 FPS), SC.AT B+7 M/CS
2712					17,2006	00000 1	FOURSEC	2DEC	400.0 B-26
2712					17,2007	00620 0			4 SEC
2713					17,2010	00040 0	DPB-9	2DEC	1 B-9
2713					17,2011	00000 1			
2714	REF	1			20,2000		SETLOC	DAPS6	
2715					20,2000		BANK		
2716	REF	1					COUNT	20/S40.8	
2717					20,2000	77214 0	S40.81	SET	VLOAD
2718	REF	3	LAST	657	20,2001	01066 0			IMPULSW
2719	REF	20	LAST	671	20,2002	15332 1			HIGZEROS
2720	REF	6	LAST	677	20,2003	03126 1	RATEZRO	STORE	OMEGAC
2721					20,2004	77776 1	EXIT		
2722	REF	15	LAST	652	20,2005	3 4672 0	CAP	POS MAX	
2723	REF	3	LAST	664	20,2006	55*447 0	TS	CNTR	

TGO LESS THAN 4 SECONDS
FOR ENGINE-OFF CALL

TVC TO ATTITUDE HOLD

INHIBIT SWITCHOVER/TVC EG TRACKING



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2724	REP	147	LAST	678	20,2007	0 6006 1	TC	INTPRET
2725					20,2010	52014 0	CLEAR	GOTO
2726	REP	3	LAST	676	20,2011	01264 0		STEERSW
2727	REP	19	LAST	677	20,2012	03657 0		QTEMP
2728					20,2013	77776 1	INCRSVG	EXIT
2729	REP	26	LAST	551	20,2014	0 5537 0	TC	ALARM
2730					20,2015	01407 0	OCT	01407
2731	REP	146	LAST	676	20,2016	0 6006 1	TC	INTPRET
2732					20,2017	77650 1	GOTO	
2733	REP	20	LAST	676	20,2020	03657 0		QTEMP
2734					20,2021	77214 0	LOTHRUST BQN	VLOAD
2735	REP	3	LAST	664	20,2022	00711 0		IDLEFAIL
2736	REP	21	LAST	676	20,2023	03657 0		QTEMP
2737	REP	21	LAST	677	20,2024	15332 1		H16ZEROS
2738	REP	7	LAST	677	20,2025	03126 1	STORE	OMEGAC
2739					20,2026	77776 1	EXIT	
2740	REP	135	LAST	663	20,2027	4 4714 0	CS	ZERO
2741	REP	3	LAST	663	20,2030	55*653 1	TS	VCNTR
2742	REP	2	LAST	103	20,2031	55*663 1	TS	VCNTRIMP
2743	REP	3	LAST	676	20,2032	55*652 0	TS	REPFRAC
2744	REP	19	LAST	665	20,2033	55*145 1	TS	NVWORD1
2745	REP	149	LAST	676	20,2034	0 6006 1	TC	INTPRET
2746					20,2035	52014 0	CLEAR	GOTO
2747	REP	4	LAST	676	20,2036	01264 0		STEERSW
2748	REP	22	LAST	676	20,2037	03657 0		QTEMP

RESTARTS OK

ALARM INDICATING THAT THRUST IS POINTING
IN WRONG DIRECTION.

THRUST FAILURE (LO-OR-NO) INDICATED
SET BY V97P. ALLOWS 1 BYPASS IN CASE OF
UNFAVORABLE S40.6 SYNCH
START OF ENGINE-FAIL (R40) OPERATIONS
PUT TVC IN ATTITUDE HOLD

KILL CSMMASS UPDATING
(TVCEXEC LOGIC REQUIRES THIS TOO)
KILL TVCDAP CG TRIM TRACKING
SET UP ENGINE-FAIL V97FLASH (CLOCKJOB)

INHIBIT STEERING AND TGO CALC (MANUAL
SHUTDOWN IF NOT SET UP AGAIN)
RESTARTS OK



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R2749 NAME S40.9 - VTGAIN (AIMPOINT MANEUVERS ONLY)
R2750 FUNCTION (1) GENERATES REQUIRED VELOCITY AND VELOCITY-TO-BE-GAINED
R2751 VECTORS FOR USE DURING AIMPOINT MANEUVERS
R2752 (2) UPDATES THE B VECTOR WHICH IS USED IN THE FINAL
R2753 CALCULATION OF EXTRAPOLATING THE VELOCITY-TO-BE-GAINED
R2754 CALLING SEQ VIA FINDVAC AS NEW JOB
R2755 INPUT RINIT - ACTIVE VEHICLE RADIUS VECTOR IN METERS AT +29.
R2756 VNIT - ACTIVE VEHICLE VELOCITY VECTOR IN METERS/CS AT +7
R2757 VRPREV - LAST COMPUTED VELOCITY REQUIRED VECTOR IN
R2758 METERS/CS AT +7.
R2759 NONTIG - TIME OF IGN. USED IN TARGETTING ROUTINES+28.5
R2760 DELT4 - TRANSFER TIME FROM PIPTIME TO TARGET+28.5
R2761 TNIT - TIME OF RINIT AND VNIT IN CS AT +28
R2762 ODT/2 - HALF OF VELOCITY GAINED IN DELTA T TIME DUE TO
R2763 ACCELERATION OF GRAVITY IN METERS/CS AT +7.
R2764 DELVREF - CHANGE IN VELOCITY DURING LAST 2 SEC IN
R2765 METERS/CS AT +7.
R2766 NORMSW SET-CENTRAL ANGLE BETWEEN RTARG AND RTIG IS BETWEEN
R2767 165 TO 195 DEGREES
R2768 RESET-CENTRAL ANGLE OUTSIDE CONE DESCRIBED ABOVE
R2769 OUTPUT VOTEMP - VELOCITY TO BE GAINED VECTOR IN METERS/CS AT +7.
R2770 COGA - INPUT OF INITIAL GUESS FOR LAMBERT FROM S40.1 0
R2771 OR PREVIOUS PASS THRU S40.9
R2772 GOBL/2 - ORBLATENESS TERM IN AVG GRAV CALC-GOBL*RSQ/MJ
R2773 VRPREV - VELOCITY REQUIRED VECTOR IN METERS/CS AT +7.
R2774 RDT - B VECTOR IN METERS/CS AT +7.
R2775 SUBROUTINES USED - INITVEL
R2776 REF 3 LAST 675 16,2000 SETLOC P40S1
R2777 16,2257 BANK

R2778 REF 7 LAST 657 E6,1746 EBANK= NBRCYCLS
R2779 REF 1 COUNT 16/S40.9

R2780 REF 150 LAST 678 16,2257 0 6006 1 S40.9 TC INTPRET
R2781 16,2260 71201 1 SETPD DLOAD
R2782 16,2261 00001 0 OOD
R2783 REF 2 LAST 666 16,2262 11456 0 LOGZEROS
R2784 16,2263 77725 1 PDOL
R2785 REF 1 16,2264 34401 0 EP4(45)L
R2786 16,2265 71214 0 BCN DLOAD
R2787 REF 5 LAST 668 16,2266 03705 0 NORMSW
R2788 16,2267 34271 1 +2
R2789 REF 1 16,2270 34403 1 EP4(10)L
R2790 16,2271 77606 1 PUSH
R2793 16,2272 45014 0 CLEAR
R2794 REF 3 LAST 481 16,2273 00675 0 CALL
R2795 REF 1 16,2274 22002 0 GUESSW
R27951 16,2275 77776 1 HAVEGURS
R27952 REF 59 LAST 675 16,2276 0 5301 0 TC PHASCHNG
R27953 16,2277 05021 1 OCT 05021

SAVE TIME BY NOT REDOING LAMBERT CALCS
C, PRIORITY NEXT, JOB BELOW



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27954				16,2300	10000 0	OCT	10000
27955	REP	151	LAST	679	16,2301 0 6008 1	TC	INTPRET
2796				16,2302	77614 1	ENDLAMB	BQN
2797	REP	3	LAST	666	16,2303 01310 1		FIRSTPLG
2798	REP	1			16,2304 34322 0		FIRSTIME
2799				16,2305	52375 1	VLOAD	VSU
2800	REP	15	LAST	669	16,2306 03612 1		VIPRIME
2801	REP	2	LAST	120	16,2307 03466 0		VRPREV
2802				16,2310	45325 1	POOL	DSU
2803	REP	3	LAST	656	16,2311 03474 0		TNIT
2804	REP	2	LAST	120	16,2312 03476 1		TNITPREV
2805				16,2313	55261 1	SL	BDDV
2806				16,2314	20222 1		17D
2807	REP	1			16,2315 34375 1		200CSH1
2808				16,2316	77761 1	VXSC	
2809				16,2317	76451 0	VSU	VSL1
2810	REP	2	LAST	77	16,2320 01207 0		GDT/2
2811	REP	7	LAST	677	16,2321 03705 0	STORE	BDT
2812				16,2322	57535 0	FIRSTIME	SLOAD
2813	REP	13	LAST	668	16,2323 03747 0		DCOMP
28131				16,2324	77640 0	BN	RTX2
2814	REP	1			16,2325 34342 0		MOONCASE
2815				16,2326	53575 0	VLOAD	UNIT
2816	REP	10	LAST	656	16,2327 01171 1		RN
2817				16,2330	45345 1	DLOAD	DSU
2818	REP	8	LAST	677	16,2331 01205 1		PIPTIME
2819	REP	3	LAST	640	16,2332 03450 0		NQMTIG
2820				16,2333	56205 0	DMP	DOV
2821	REP	1			16,2334 34377 0		EARTHU
2822				16,2335	00043 0		34D
2823				16,2336	53361 0	VXSC	VAD
2824	REP	2	LAST	77	16,2337 01215 0		GOBL/2
2825	REP	2	LAST	656	16,2340 03646 0		VGTEMP
2826	REP	3	LAST	680	16,2341 03646 0	STORE	VGTEMP
2827				16,2342	77776 1	MOONCASE	EXIT
2828	REP	60	LAST	679	16,2343 0 5301 0	TC	PHASCHNG
2829				16,2344	04021 0	OCT	04021
2830	REP	152	LAST	680	16,2345 0 6008 1	COPY40.9	TC
2831				16,2346	77745 1		INTPRET
2832	REP	4	LAST	880	16,2347 03474 0	DLOAD	
2833	REP	3	LAST	680	16,2350 27476 1		TNIT
2834	REP	16	LAST	680	16,2351 03612 1	STOVL	TNITPREV
2835	REP	3	LAST	880	16,2352 03486 0		VIPRIME
2836				16,2353	77414 0	STORE	VRPREV
2837	REP	4	LAST	680	16,2354 01270 0	CLEAR	EXIT
2838	REP	81	LAST	657	16,2355 4 4712 0		FIRSTPLG
2839	REP	8	LAST	679	16,2356 55-748 1	-2	CS
2840	REP	61	LAST	880	16,2357 0 5301 0	ENDS40.9	TS
2841				16,2360	00001 0	TC	PHASCHNG
						OCT	00001

NOTE NO TEST IS MADE TO SUBTRACT GOBL
INSIDE 165-195 DEGREE CONE AREA.

C, JOB BELOW

REDO40.9 (RESTART) ENTRY TO END S40.9



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2842	REP	89	LAST	664	16,2361	1 5112 1	TCP	ENDOFJOB	
28421	REP	153	LAST	880	16,2362	0 6006 1	REDO40.9 TC	INTPRET	S40.9 RESTARTS COME HERE TO GRACEFULLY
28422					16,2363	77775 1	VLOAD		TERMINATE S40.9 SO THAT IT CAN BE
28423	REP	3	LAST	679	18,2364	11458 0		LOGZEROS	SET UP WITH LATEST R,V,T NEXT PASS
28424	REP	6	LAST	658	16,2365	17351 0	STODL	DELVSUM	(TYPE C PHASE POINTS =04021= WILL
28425	REP	4	LAST	681	18,2366	11456 0		LOGZEROS	FORCE NORMAL S40.9 TERMINATIONS,
28426	REP	9	LAST	680	18,2367	27347 1	STOVL	NBRCYCLS	RATHER THAN LOSE TIME OF BRAND NEW
284262	REP	5	LAST	676	16,2370	03721 0		VGPREV	PASS -- QUICK OLD DATA BETTER THAN
284264	REP	4	LAST	680	16,2371	03646 0	STORE	VOTEMP	NONE) NOW CAN GO THRU SETUP.9
28427					16,2372	77778 1	EXIT		WITHOUT DISTURBING VGPREV
28428	REP	1			16,2373	1 2355 1	TCP	ENDS40.9 -2	STORE 0,0 COVERED NBRCYCLS,P -- FIX UP S
2843					16,2374	01440 0	200CSHI	2DEC	200 B-12
2843					16,2375	00000 1			
2844					16,2376	55340 0	EARTHQU	2DEC*	-3.986032 E10 B-38*
2844					16,2377	61710 0			
2845					16,2400	04000 0	EP4(45)L	2DEC	.125
2845					16,2401	00000 1			
2846					18,2402	00707 1	EP4(10)L	2DEC	.027777777
2846					16,2403	03434 1			



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P2847 NAME 540.13 - TIMEBURN
R2848 FUNCTION (1) DETERMINE WHETHER A GIVEN COMBINATION OF VELOCITY-TO-
R2849 BE-GAINED AND ENGINE CHOICE RESULT IN A BURN TIME SUFFICIENT
R2850 TO ALLOW STEERING AT THE VEHICLE DURING THE BURN, AND
R2851 (2) THE MAGNITUDE OF RESULTING BURN TIME - IF IT IS SHORT -
R2852 AND THE ASSOCIATED TIME OF THE ENGINE-OFF SIGNAL.
R2853 CALLING SEQ VIA FINDVAC AS NEW JOB.
R2854 INPUT VGTIG - VELOCITY TO BE GAINED VECTOR (METERS/C.S.) AT +7
R2855 WEIGHT/G - MASS OF VEHICLE IN KGM AT TIG
R2856 F - ENGINE THRUST IN M. NEWTONS AT +7
R2857 MDOT - RATE OF DECREASE OF VEHICLE MASS DURING ENGINE BURN
R2858 IN KILOGRAMS/CENTISECOND AT +3. THIS SCALING MAY
R2859 REQUIRE MODIFICATION FOR SATURN BURNS.
R2860 OUTPUT IMPULSW - ZERO FOR STEERING
R2861 - ONE FOR ATTITUDE HOLD
R2862 TGO - TIME TO BURN IN CENTISECONDS AT +14
R2863 THE QUANTITY M. NEWTON SHALL BE USED TO EXPRESS WEIGHT IN TERMS OF
R2864 (KILOGRAMMETER)/(CENTISECOND*CENTISECOND)
R2865 (1) M. NEWTON = (10000) NEWTONS
R2866 REF 17 LAST 677 E7,1427
R2867 REF 1

2868 REP 154 LAST 681 16,2404 0 6008 1 S40.13 TC INTPRET
2869 16,2405 43001 1 SETPD SET
2870 16,2408 00001 0 00D
2871 REP 4 LAST 677 16,2407 01088 0 IMPULSW
2872 18,2410 51575 1 VLOAD ABVAL
2873 REP 12 LAST 689 18,2411 03721 0 VGTIG
2874 18,2412 77778 1 EXIT
2875 REP 37 LAST 654 18,2413 3 4704 0 CAP BIT7
2876 16,2414 0 0008 1 EXTEND
2877 REP 4 LAST 583 16,2415 08 031 0 RXOR CHAN31
2878 REP 38 LAST 682 18,2418 7 4704 1 MASK BIT7
2879 16,2417 0 0008 1 EXTEND
2880 REP 1 16,2420 1 2502 0 BZF NOTADDUL
2881 REP 155 LAST 682 16,2421 0 8008 1 TC INTPRET
2882 16,2422 58325 0 PDDL DOV
2883 REP 1 16,2423 38027 1 S40.135
2884 REP 4 LAST 689 18,2424 03078 0 WEIGHT/G
2885 16,2425 72414 0 BCN SL1
2886 REP 2 LAST 644 18,2428 00700 0 NJETSPLG
2887 REP 1 16,2427 34430 1 S40.130
2888 18,2430 77821 1 BDSJ
2889 16,2431 58325 0 PDDL DOV
2890 REP 1 16,2432 38013 0 KIVAL
2891 REP 5 LAST 682 16,2433 03078 0 WEIGHT/G
2892 16,2434 50021 1 BDSJ RAN
2893 16,2435 00001 0 00D
2894 REP 1 16,2438 34481 0 S40.131
2895 16,2437 41325 0 PDDL DMP

EBANK= TGO
COUNT 18/40.13

ASSUME NO STEERING UNTIL FOUND OTHERWISE

VELOCITY TO BE GAINED AT +7

TEST +X TRANSLATION

00D = MAG OF VGTIG AT +7
COMPENSATION FOR 2 JET ULLAGE AT +24
MASS IN KGM AT +18
DOUBLE CORRECTION IF FOUR JETS00D = MAG OF VGTIG CORRECTED FOR ULLAGE
M. NEWTON-CS AT +24TGO LESS THAN 100 CS
02D = TEMP1 AT +7



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2896	REP	2	LAST	654	16,2440	00111 0		ENDOT	SPS FLOW RATE SC.AT B+3 KG/CS (SP, NOTE)
2900	REP	1			16,2441	38023 0		3.5SEC	350 CS AT +14
2901					16,2442	65221 0	BDSU	PDDL	
2902	REP	6	LAST	682	16,2443	03078 0		WEIGHT/G	
2903	REP	5	LAST	689	16,2444	03727 0		F	F AT +7
2904					16,2445	60405 0	DMP	SR2	
2905	REP	1			16,2446	38025 0		5SECOND	500 CS AT +14
2906					16,2447	41471 0	DDV	PUSH	04D = TEMP2
2907					16,2450	51021 0	BDSU	BPL	
2908					16,2451	00003 1		02D	
2909	REP	1			16,2452	34475 0		S40.133	TGO GREATER THAN 600 CS
2910					16,2453	55345 0	DLOAD	BDDV	
2911					16,2454	43205 1	DMP	DAD	
2912	REP	2	LAST	683	16,2455	36025 0		5SECOND	500 CS AT +14
2913	REP	1			16,2456	36021 1		1SEC2D	100 CS AT +14
2914					16,2457	77650 1	GOTO		
2915	REP	1			16,2460	34468 1		S40.132	
2916					16,2461	41345 0	S40.131 DLOAD	DMP	TGO LESS THAN 100 CS
2917	REP	7	LAST	683	16,2462	03078 0		WEIGHT/G	
2918					16,2463	58215 1	DAD	DDV	
2919	REP	1			16,2464	36015 0		K2VAL	M,NEWTON-CS AT +24
2920	REP	1			16,2465	36017 1		K3VAL	M,NEWTONS AT +10
2921					16,2466	77776 1	S40.132	EXIT	
2922	REP	18	LAST	682	ET,1427			BRANK=	TGO
2923	REP	7	LAST	347	16,2467	0 7226 0		TC	TPAGREE
2924	REP	271	LAST	657	16,2470	3 0154 1		CA	MPAC
2925	REP	67	LAST	657	16,2471	56 001 0		XCH	L
2926	REP	136	LAST	678	16,2472	3 4714 1		CA	ZERO
2927	REP	19	LAST	683	16,2473	53=430 0		DXCH	TGO
2928	REP	1			16,2474	0 2477 1		TC	S40.134
2929					16,2475	77414 0	S40.133	CLEAR	EXIT
2930	REP	5	LAST	682	16,2476	01268 1		IMPULSW	WILL STEER VEHICLE
2931	REP	62	LAST	680	16,2477	0 5301 0	S40.134	TC	PHASCHNG
2932					16,2500	00003 1		OCT	3
2933	REP	90	LAST	681	16,2501	1 5112 1		TCF	ENDOFJOB
2934	REP	156	LAST	682	16,2502	0 6006 1	NOTADDUL	TC	INTPRET
2935					16,2503	77650 1		GOTO	
2936	REP	2	LAST	682	16,2504	34431 0		S40.130 +1	DO NOT COMPENSATE FOR 7 SEC OF ULLAGE
2937	REP	2	LAST	677	17,2000			SETLOC	DAPS7
2938					17,2012			BANK	
2939	REP	1						COUNT	17/40.13
2940					17,2012	00001 0	K1VAL	ZDEC	864.52887 B-23 19885 LB-SEC, SC.AT B+23 NEWTON-SEC/E+2
2940					17,2013	27221 0			
2941					17,2014	00000 1	K2VAL	ZDEC	293.137805 B-23 6590 LB-SEC, SC.AT B+23 NEWTON-SEC/E+2
2941					17,2015	22244 0			



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2942	17,2016	00570 0	K3VAL	2DEC	11.7766668 B-9	26475 LBS, SC.AT B+9 NEWTONS/E+4
2942	17,2017	33235 0				
2943	17,2020	00144 0	1SEC20	2DEC	100.0 B-14	100.0 CS AT +14
2943	17,2021	00000 1				
2944	17,2022	01274 1	3.5SEC	2DEC	350.0 B-13	350.0 CS AT +13
2944	17,2023	00000 1				
2945	17,2024	00764 1	5SECOND	2DEC	500.0 B-14	500 CS AT +14
2945	17,2025	00000 1				
2946	17,2026	00000 1	S40.135	2DEC	69.6005183 B-23	IMPULSE FROM 7.96 SECS OF 2-JET FIRING
2946	17,2027	04263 1				

A294602
A294603
A294604

7.96(199.6)COS(10) LB-SEC, SC.AT
B+23 NEWTON-SEC/E+2 (7 SEC ULLAGE
TO GO, PLUS 0.96 SEC FROM PIPTIME)



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P2947 NAME S40.6 GIMBAL DRIVE TEST AND/OR GIMBAL TRIM
R2948 MOD NO 5 DATE 9 MARCH, 1967
R2949 MOD BY ENGEL LOG SECTION P40-P47
R2950 FUNCTIONAL DESCRIPTION
R2951 GIMBAL DRIVE TEST...0,+2,-2,0 DEGREE ENGINE COMMANDS, AT 2 SECOND
R2952 INTERVALS, FIRST IN PITCH, THEN IN YAW. ASTRONAUT VERIFICATION
R2953 OF GIMBAL MOTION ON GPI
R2954 GIMBAL TRIM...AFTER A 4 SECOND DELAY,ENGINE COMMANDED TO
R2955 PRE-COMPUTED TRIM POSITION. ASTRONAUT VERIFICATION ON GPI.
R2956 PRE40.6...RESTART ENTRY TO RE-DO S40.6, ONLY IF RCS IS ON - IF TVC
R2957 IS NOT ON - PRIMARILY TO GET ACTUATORS TRIMMED FOR IGNITION.
R2958 BYPASS 4 SEC DELAY. SPEED IS CRITICAL NEAR IGNITION.
R2959 IF TVC IS ON (TVCDAPON OR LATER) THEN REDOTVC WILL TAKE CARE
R2960 OF RESTARTING ACTUATORS.
R2961 CALLING SEQUENCE....
R2962 WAITLIST, WITH 2CADR FOR S40.8 (OR PRE40.8), WITH EBANK= CNTR
R2963 NORMAL EXIT MODE - FIXDELAY, TASKOVER
R2964 SUBROUTINES CALLED....
R2965 OUTPUT (INTERNAL)
R2966 FIXDELAY
R2967 ALARM OR ABORT EXIT MODES - NONE
R2968 ERASEABLE INITIALIZATION REQUIRED
R2969 CNTR = +0, NORMALLY SET BY THE P40 CALL AT TST,TRIM
R2970 MRKTRMP...POSITIVE FOR GIMBAL DRIVE TEST AND GIMBAL TRIM (BOTH)
R2971 NEGATIVE FOR GIMBAL TRIM ONLY
R2972 FACTOFF, YACTOFF SC.AT 85.41 ARCSEC/BIT (V48N48 P,YTRIM)
R2973 ...SC CONT.. SWITCH AT ..CNC.. (A/P CONTROL SWITCH AT ..GNC..)
R2974 ACTIVE SPS GIMBAL MOTOR POWER(S), PITCH, YAW
R2975 OUTPUT
R2976 TVCYAW, TVCPITCH (BITS RELEASED)
R2977 TVC ENABLE AND OPTICS ERROR COUNTER ENABLE
R2978 DEBRIS
R2979 TEMPR60, CNTR
R2980
2981 REF 2 LAST 677 17,2030 BANK 17
2982 SETLOC DAPS6
2983 BANK
2984 REF 4 LAST 677 E6,1447 EBANK= CNTR
2985 REF 1 COUNT 20/S40.6
2988 REF 22 LAST 853 20,2040 4 0102 0 PRE40.8 CS FLAGWRD8 RESTART ENTRY TO S40.6 (DO NOT PERMIT
2987 REF 11 LAST 852 20,2041 7 4105 0 MASK OCT60000 IF TVC, BITS 15,Y4 = 1,0)
2988 20,2042 0 0008 1 EXTEND
2989 20,2043 8 2045 1 BZMF +2
29892 REF 38 LAST 685 20,2044 1 5213 0 TCF TASKOVER TVC, REDOTVC WILL, REESTABLISH INTERFACE
2990 REF 48 LAST 676 20,2045 4 4712 0 CS BIT1 RCS, SO DO S40.6, GIMTRIM ONLY

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2991	REP	3	LAST	641	20,2046	55=445	1		TS	MRKTRMP
2992	REP	49	LAST	885	20,2047	3 4712	1		CAP	BIT1
2993	REP	5	LAST	685	20,2050	55=447	0		TS	CNTR
A2994										
29945	REP	6	LAST	686	E6,1447				EBANK=	CNTR
2995	REP	137	LAST	683	20,2051	4 4714	0	S40.6	CS	ZERO
2996	REP	24	LAST	655	20,2052	55=303	1		TS	OPTIND
2997	REP	27	LAST	847	20,2053	4 4711	0		CS	BIT2
2998					20,2054	0 0006	1		EXTEND	
2999	REP	27	LAST	655	20,2055	03 012	1		WAND	CHAN12
3000	REP	1			20,2056	3 2143	0		CAP	OCT02200
3001					20,2057	0 0008	1		EXTEND	
3002	REP	28	LAST	888	20,2060	05 012	1		WOR	CHAN12
3003	REP	8	LAST	685	20,2061	0 5156	0		TC	FIXDELAY
3004					20,2062	00006	1		DEC	8
3005	REP	26	LAST	688	20,2063	3 4711	1		CAP	BIT2
3006					20,2064	0 0008	1		EXTEND	
3007	REP	29	LAST	686	20,2065	05 012	1		WOR	CHAN12
3008	REP	9	LAST	686	20,2066	0 5156	0		TC	FIXDELAY
3009					20,2067	00002	0		DEC	2
3010	REP	7	LAST	686	20,2070	11=447	0	RSTRST	CCS	CNTR
3011	REP	1			20,2071	1 2131	1		TCF	GIMTRIM +2
A3012										
3013	REP	4	LAST	686	20,2072	31=445	0		CAE	MRKTRMP
3014	REP	8	LAST	686	20,2073	55=447	0		TS	CNTR
3015					20,2074	0 0008	1		EXTEND	
3016	REP	2	LAST	686	20,2075	6 2127	1		BZMP	GIMTRIM
3017	REP	136	LAST	886	20,2076	4 4714	0	GDTSETUP	CS	ZERO
3018	REP	9	LAST	886	20,2077	55=447	0		TS	CNTR
3019	REP	1			20,2100	3 2145	0	GIMDTEST	CAP	+2ACTDEG
3020	REP	1			20,2101	0 2114	1		TC	OUTPUT
3021	REP	1			20,2102	3 2144	1		CAP	-4ACTDEG
3022	REP	2	LAST	688	20,2103	0 2114	1		TC	OUTPUT
3023	REP	2	LAST	686	20,2104	3 2145	0		CAP	+2ACTDEG
3024	REP	3	LAST	888	20,2105	0 2114	1		TC	OUTPUT
3025	REP	10	LAST	688	20,2106	4 1447	0		CS	CNTR

FOR REVISED S40.6 TIMING FOR RESTARTS...
TO INDICATE A RESTART ENTRY (CNTR IS
NORMALLY +0, BY S40.6)

INHIBIT OPTICS ACTIVITY

DISENABLE OPTICS ERROR COUNTERS (ZERO,
AND INHIBIT PULSE TRANSMISSION -
NORMAL STATE)

TVC ENABLE (SPS SERVO AMPS SEE DAC
VOLTAGES) AND DISENGAGE OPTICS/DAC

60MS PROCEDURAL DELAY (40MS MINIMUM) FOR
RELAY LATCHING

ENABLE OPTICS ERROR COUNTERS

20MS PROCEDURAL DELAY (4MS MINIMUM) FOR
RELAY LATCHING

CHECK FOR RESTART ENTRY (PRE40.6)
RESTART ENTRY....BYPASS 4 SECOND DELAY
TST, TRIM SETS +0 ON NORMAL ENTRY

CHECK FOR TEST/TRIM OR TRIM ONLY
MRKTRMP SAVES CNTR FOR RESTARTS

(TRIM ONLY)

GIMBAL DRIVE TEST SETUP, FOR PITCH

GIMBAL DRIVE TEST, 1ST INCREMENT
(LEAVES GIMBAL AT +2 DEG)
2ND INCREMENT (LEAVES GIMBAL AT -2)

3RD INCREMENT (LEAVES GIMBAL AT -0)

CHECK FOR COMPLETION OF YAW TEST



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3026	REF	157	LAST	676	20,2107	10 000 0	CCS	A		
3027	REF	3	LAST	686	20,2110	1 2127 0	TCP	GIMTRIM	COMPLETED, GO TO GIMBAL TRIM ROUTINE	
3028	REF	50	LAST	686	20,2111	4 4712 0	CS	BIT1	SET UP YAW TEST	
3029	REF	11	LAST	686	20,2112	55=447 0	TS	CNTR		
3030	REF	1			20,2113	1 2100 0	TCP	GIMDTEST	FOR YAW TEST	
3031					20,2114	0 0006 1	OUTPUT	EXTEND	OUTPUT THE INCREMENT....SAVE 0	
3032	REF	4	LAST	384	20,2115	23=146 0	QXCH	TEMPR80		
3033	REF	12	LAST	687	20,2116	51=447 1	INDEX	CNTR		
3034	REF	1			20,2117	54 054 1	TS	TVC PITCH		
3035	REF	13	LAST	687	20,2120	51=447 1	INDEX	CNTR		
3036	REF	21	LAST	659	20,2121	3 4700 1	CAP	BIT11		
3037					20,2122	0 0006 1	EXTEND			
3038	REF	5	LAST	179	20,2123	05 014 1	WOR	CHAN14		
3039	REF	10	LAST	686	20,2124	0 5156 0	TC	FIXDELAY	WAIT 2SEC, WHILE ASTRONAUT VERIFIES	
3040					20,2125	00310 0	DEC	200	GIMBAL MOTION ON GPI	
3041	REF	5	LAST	687	20,2126	0 1146 0	TC	TEMPR80		
3042	REF	11	LAST	687	20,2127	0 5156 0	GIMTRIM	TC	WAIT 4 SECONDS BEFORE GIMBAL TRIM	
3043					20,2130	00620 0	DEC	400		
3044	REF	139	LAST	686	20,2131	4 4714 0	+2	CS	ZERO	PICK UP TRIM VALUES AND OUTPUT THEM
3045	REF	14	LAST	671	20,2132	6 1425 0	AD	PACTOFF	(AVOID +0) ENTRY POINT FROM RSTRTST	
3046	REF	2	LAST	687	20,2133	54 054 1	TS	TVC PITCH	ON A RESTART, TO AVOID 4SEC DELAY	
3047	REF	140	LAST	687	20,2134	4 4714 0	CS	ZERO		
3048	REF	4	LAST	671	20,2135	6 1426 0	AD	YACTOFF		
3049	REF	1			20,2136	54 053 0	TS	TVCYAW		
3050	REF	2	LAST	165	20,2137	3 4755 1	CAP	PRIO6	RELEASE THE COUNTERS, BITS 11,12	
3051					20,2140	0 0006 1	EXTEND			
3052	REF	6	LAST	687	20,2141	05 014 1	WOR	CHAN14		
3053	REF	39	LAST	685	20,2142	1 5213 0	ENDS40.6	TCP	TASKOVER	
30535					20,2143	02200 1	OCT02200	OCT	02200	BITS 6,11 FOR CHANNEL 12 TVC/OPTICS
3054					20,2144	77527 1	-4ACTDEG	DEC	-166	-2(+2ACTDEG), WHOLE BITS, NO ROUNDUP
3055					20,2145	00124 0	+2ACTDEG	DEC	+64	+2 DEG, SC AT 85.41 ARCSEC/BIT (+84D)
R3056	CALLED BY ..DONOUN46... (VERB 46), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP) VIA IBKCALL									
3058	REF	1					COUNT	20/S41.2		
3059	REF	52	LAST	676	20,2146	3 1466 1	S41.2	CA	DAPDTR1	

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3060 REF 22 LAST 652 20,2147 7 8214 1
3061 REF 156 LAST 687 20,2150 8 0000 1
3062 REF 4 LAST 409 20,2151 55=130 0

MASK THREE
AD A
TS RATEINDX

3063
3064 REF 53 LAST 667 20,2152 0 0004 0
3065 REF 10 LAST 847 20,2153 31=466 1
3066 REF 1 20,2154 7 4371 1
3067 20,2155 8 7705 1
3068 REF 1 20,2156 0 0006 1
3069 REF 1 20,2157 1 2164 1

INHINT
CAE DAPDATR1
MASK PRI030
AD -BIT14
EXTEND
BZF TOGETHER

IS LEM ATTACHED (BITS 14,13 OF DAPDATR1
=10)

(OCTS7777)

YES

3070 REF 29 LAST 666 20,2160 4 4711 0
3071 REF 13 LAST 665 20,2161 7 0103 1
3072 REF 14 LAST 666 20,2162 54 103 1

CS BIT2
MASK FLAGWRD7
TS FLAGWRD7

NO, UNSET FLAG

3072 20,2163 1 2187 1

TCF +4

3073 REF 15 LAST 666 20,2184 4 0103 1
3074 REF 30 LAST 666 20,2185 7 4711 0
3075 REF 16 LAST 666 20,2186 26 103 1

TOGETHER CS FLAGWRD7
MASK BIT2
ADS FLAGWRD7

ATTACHED, SET FLAG FOR INTEGRATION

3076 20,2187 0 0003 1

RELINT

3077 REF 54 LAST 888 20,2170 3 1488 1
3078 REF 28 LAST 843 20,2171 7 4707 1
3079 20,2172 0 0008 1
3080 20,2173 8 2175 0
3081 REF 1 20,2174 3 2275 0
3082 REF 1 20,2175 8 2278 0
3083 REF 4 LAST 643 20,2176 55=855 1

CA DAPDATR1
MASK BIT4
EXTEND
BZMF +2
CA DEC409
AD DEC48
TS AD8

DEC 48 MEANS NARROW DB

DEC 455 MEANS WIDE DB

3084 REF 55 LAST 668 20,2177 3 1488 1
3085 REF 39 LAST 882 20,2200 7 4704 1
3086 20,2201 0 0008 1
3087 20,2202 6 2204 0
3088 REF 82 LAST 880 20,2203 3 4712 1
3089 REF 2 LAST 107 20,2204 55=631 0
3090 REF 56 LAST 888 20,2205 3 1488 1
3091 REF 27 LAST 418 20,2206 7 4701 1
3092 20,2207 0 0008 1
3093 20,2210 6 2212 1
3094 REF 83 LAST 668 20,2211 4 4712 0
3095 REF 3 LAST 886 20,2212 27=631 0

CA DAPDATR1
MASK BIT7
EXTEND
BZMF +2
CA ONE
TS XTRANS
CA DAPDATR1
MASK BIT10
EXTEND
BZMF +2
CS ONE
ADS XTRANS

QUAD BD

QUAD AC

3096 20,2213 0 0004 0
3097 20,2214 0 0006 1
3098 20,2215 1 2222 0
3099 REF 15 LAST 564 20,2216 4 0075 1
3100 REF 33 LAST 654 20,2217 7 4874 1
3101 REF 16 LAST 666 20,2220 26 075 1

INHINT
EXTEND
BZF +5
CS FLAGWRD1
MASK BIT15
ADS FLAGWRD1

CLEAR NJETSFLG (4 JETS, OR NO JETS)
SET NJETSFLG (2 JETS, AC OR BD QUADS)
NJETSFLG = 1 FOR 2 JET UNLAGE (AC OR BD)



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3102				20,2221	1 2225 1	TCP	+4
3103	REF	34	LAST	686	20,2222 4 4674 1	CS	BIT15
3104	REF	17	LAST	688	20,2223 7 0075 1	MASK	FLAGWRD1
3105	REF	16	LAST	669	20,2224 54 075 1	TS	FLAGWRD1
3106				20,2225 0 0003 1	RELINT		
3107	REF	2	LAST	274	20,2228 3 1487 0	CA	DAPDATR2
3108	REF	30	LAST	665	20,2227 7 4876 0	MASK	BIT13
3109				20,2230 0 0008 1	EXTEND		
3110				20,2231 6 2233 1	BZMP	+2	
3111				20,2232 1 2234 1	TCP	+2	
3112	REF	64	LAST	688	20,2233 4 4712 0	CS	ONE
3113				20,2234 4 0000 0	COM		
3114	REF	2	LAST	107	20,2235 55=830 1	TS	ACORRD
3115	REF	3	LAST	689	20,2238 3 1487 0	CA	DAPDATR2
3116	REF	28	LAST	688	20,2237 7 4701 1	MASK	BIT10
3117	REF	159	LAST	688	20,2240 10 000 0	CCS	A
3118				20,2241 1 2245 1	TCP	+4	
3119	REF	85	LAST	689	20,2242 3 4712 1	CA	ONE
3120	REF	2	LAST	107	20,2243 55=626 0	TS	RACFAIL
3121	REF	1			20,2244 1 2255 0	TCP	BDFAIL
3122	REF	141	LAST	687	20,2245 3 4714 1	CA	ZERO
3123	REF	3	LAST	669	20,2248 55=628 0	TS	RACFAIL
3124	REF	4	LAST	669	20,2247 3 1467 0	CA	DAPDATR2
3125	REF	29	LAST	666	20,2250 7 4707 1	MASK	BIT4
3126	REF	160	LAST	669	20,2251 10 000 0	CCS	A
3127	REF	2	LAST	669	20,2252 1 2255 0	TCP	BDFAIL
3128	REF	66	LAST	669	20,2253 4 4712 0	CS	ONE
3129	REF	4	LAST	669	20,2254 55=626 0	TS	RACFAIL
3130	REF	5	LAST	689	20,2255 3 1487 0	CA	DAPDATR2
3131	REF	40	LAST	688	20,2256 7 4704 1	MASK	BIT7
3132	REF	161	LAST	669	20,2257 10 000 0	CCS	A
3133				20,2280 1 2284 1	TCP	+4	
3134	REF	87	LAST	669	20,2281 3 4712 1	CA	ONE
3135	REF	2	LAST	107	20,2262 55=627 1	TS	REDFAIL
3136	REF	185	LAST	682	20,2263 0 0002 0	TC	0
3137	REF	142	LAST	889	20,2264 3 4714 1	CA	ZERO
3138	REF	3	LAST	869	20,2265 55=827 1	TS	REDFAIL
3139	REF	6	LAST	869	20,2266 3 1467 0	CA	DAPDATR2
3140	REF	51	LAST	887	20,2267 7 4712 0	MASK	BIT1
3141	REF	162	LAST	689	20,2270 10 000 0	CCS	A
3142	REF	188	LAST	689	20,2271 0 0002 0	TC	0
3143	REF	68	LAST	889	20,2272 4 4712 0	CS	ONE
3144	REF	4	LAST	689	20,2273 55=827 1	TS	REDFAIL
3145	REF	187	LAST	889	20,2274 0 0002 0	TC	0
R3146	DAPFIG ENTRY VIA TC POSTJUMP AS JOB FROM ...STABLISH... (VERR 48)					BANK	42
3147				42,3521		SETLOC	EXTVBS
3148	REF	2	LAST	247	42,2000		

NJETSFLG = 0 FOR 4 JET (OR 0 JET) ULLAGE

MINUS FOR A-C, PLUS FOR B-D



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3149			42,3521		BANK		
3150	REP	25	LAST	665	42,3521	4 4702 1	DAPFIG CS BIT9
3151					42,3522	0 0006 1	EXTEND
3152	REP	30	LAST	666	42,3523	03 012 1	WAND CHAN12
3153	REP	57	LAST	668	42,3524	31=466 1	CAB DAPDATR1
3154					42,3525	0 0006 1	EXTEND
3155	REP	23	LAST	645	42,3526	7 4710 1	MP BIT3
3156	REP	23	LAST	668	42,3527	7 6214 1	MASK THREE
3157	REP	163	LAST	669	42,3530	50 000 1	INDEX A
3158					42,3531	1 3532 1	TOP +1
3159	REP	1			42,3532	1 3544 0	TOP NODAPUP
3160	REP	1			42,3533	1 3537 1	TOP RCSDAPUP
3161	REP	2	LAST	690	42,3534	1 3537 1	TOP RCSDAPUP
3162	REP	42	LAST	657	42,3535	0 4574 0	TC POSTJUMP
3163	REP	1			42,3536	67211 1	CADR SATSTKON
3164					42,3537	0 0004 0	RCSDAPUP INHINT
3165	REP	29	LAST	664	42,3540	0 4633 0	TCR IBKCALL
3166	REP	5	LAST	664	42,3541	42010 0	CADR RCSDAPON
3167					42,3542	0 0003 1	RELINT
3168	REP	1			42,3543	1 3561 1	TOP ENDFIG
3169					42,3544	0 0006 1	NODAPUP EXTEND
3170	REP	1			42,3545	3 3564 0	DCA T5IDLDAP
3171	REP	10	LAST	652	42,3546	53=313 0	DXCH T5LOC
3172	REP	44	LAST	664	42,3547	0 5447 0	TC DOWNFLAG
31725	REP	1			42,3550	00132 1	ADRES DAPBIT1
3173	REP	45	LAST	690	42,3551	0 5447 0	TC DOWNFLAG
31732	REP	1			42,3552	00133 0	ADRES DAPBIT2
31734					42,3553	0 0004 0	INHINT
31735	REP	30	LAST	690	42,3554	0 4633 0	TC IBKCALL
31736	REP	2	LAST	539	42,3555	42616 0	CADR ZEROJET
31738					42,3556	0 0003 1	RELINT
3174	REP	52	LAST	689	42,3557	3 4712 1	CAF BIT1
3175	REP	6	LAST	566	42,3560	55=332 0	TS HOLDFLAG
3176	REP	43	LAST	690	42,3561	0 4574 0	TC POSTJUMP
3177	REP	28	LAST	539	42,3562	66121 0	CADR GOPIN
3178	REP	15	LAST	667	E6,1425		EBANK= PACTOFF
3179	REP	5	LAST	646	42,3563	03143 1	T5IDLDAP ZCADR T5IDLOC
3179					42,3564	12106 0	
3160					17,2030		BANK 17
3161	REP	3	LAST	665	20,2000		SETLOC DAPS6
3162					20,2275		BANK
3163					20,2275	00631 0 DEC409	DEC 409
3164					20,2276	00056 1 DEC46	DEC 46
R3165	CALLED BY ..DONOUN47.. (VERB 46), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP)						

TURN OFF SIVB TAKEOVER

DETERMINE VEHICLE CONFIGURATION

RIGHT SHIFT 4 OCTAL DIGITS
(IN CASE BIT 15 IS USED)

BRANCH BASED ON CONFIG....

CM.....ACTIVATE NODAP
CM.....ACTIVATE RCSDAP
CM/LEM..ACTIVATE RCSDAP

CALL TO ACTIVATE RCSDAP, AND RETURN

CAME IN VIA V46, GO OUT VIA GOPIN
T5 IDLE FOR NODAP (DON'T WORRY ABOUT T)

RESET T5-USAGE FLAGS FOR NODAP
BIT 15 FLAG 6 = 0

BIT 14 FLAG 6 = 0

ZERO JET CHANNELS IN 14 MS AND THEN
LEAVE THE T6 CLOCK DISABLED.

KILL KALCMANU JOB

CAME IN VIA V46, GO OUT VIA GOPIN



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3186	REP	1		20,2277	31=470 0	840.14	CAE	IXX	
3187				20,2300	0 0008 1		EXTEND		
3188	REP	1		20,2301	7 2324 1		MP	CONTONE	
3189	REP	2	LAST 107	20,2302	55=623 0		TS	J/M	
3190	REP	1		20,2303	3 1471 1		CA	IAVG	
3191				20,2304	0 0008 1		EXTEND		
3192	REP	2	LAST 691	20,2305	7 2324 1		MP	CONTONE	
3193	REP	2	LAST 107	20,2306	55=624 1		TS	J/M1	
3194	REP	2	LAST 107	20,2307	55=625 0		TS	J/M2	
3195				20,2310	0 0008 1		EXTEND		
3196	REP	1		20,2311	3 2328 1		DCA	CONTTWO	
3197				20,2312	0 0008 1		EXTEND		
3198	REP	2	LAST 691	20,2313	11=470 1		DV	IXX	
3199	REP	2	LAST 107	20,2314	55=620 0		TS	KMJ	
3200				20,2315	0 0008 1		EXTEND		
3201	REP	2	LAST 691	20,2316	3 2328 1		DCA	CONTTWO	
3202				20,2317	0 0008 1		EXTEND		
3203	REP	2	LAST 691	20,2320	11=471 0		DV	IAVG	
3204	REP	2	LAST 107	20,2321	55=621 1		TS	KMJ1	
3205	REP	2	LAST 107	20,2322	55=622 1		TS	KMJ2	
3206	REP	166	LAST 669	20,2323	0 0002 0		TC	0	
3207				20,2324	25137 0	CONTONE	DEC	.862034	2PI/M
3208				20,2325	00023 0	CONTTWO	2DEC	.00116	
3209	REP	1		20,2326	12522 1		COUNT	24/TVNG	
3210				31,3215			BANK	31	
3211	REP	3	LAST 670	24,2000			SETLOC	P40S	
3212				24,3677			BANK		
3213				24,3677	37405 1	POS-2.5	OCT	37405	
3214	REP	56	LAST 690	E6,1466			ERANK=	DAPDATR1	
3215	REP	1		24,3700	02000 0	RSCADR	2CADR	RCSUP	
3216	REP	1		24,3701	42106 0				
3217				24,3702	37704 0	6SECTS	OCT	37704	
3218	REP	1					COUNT	21/RCSUP	
3219				20,2327			BANK	20	
3220	REP	1		21,2000			SETLOC	DAPS3	
3221				21,2000			BANK		
3222	REP	6	LAST 577	21,2000	22 016 0	RCSUP	LXCH	BANKRUPT	



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3223				21,2001	0 0008 1		EXTEND	
3224	REP	6	LAST	577	21,2002	22 012 1	QXCH	CRUPT
3225	REP	6	LAST	690	21,2003	0 2010 1	TCR	RCSADPN
3226	REP	27	LAST	540	21,2004	1 5222 1	TCF	RESUME
3227	REP	59	LAST	691	E6,1488		EBANK=	DAPDTRI
3228	REP	2	LAST	200	21,2005	02108 1	RCSADDR	2CADR
3228					21,2006	42108 0		RCSATT
3229					21,2007	37704 0	0.6SECTS	OCT 37704
A3230								
3231	REP	1			21,2010	3 2007 1	RCSADPN-CAP	0.6SECTS
3232	REP	7	LAST	652	21,2011	54 030 0	+1 TS	TIMES
3233	REP	1			21,2012	55=485 0	TS	TS PHASE
3234	REP	10	LAST	539	21,2013	4 1501 0	CS	RCSFLAGS
3235	REP	24	LAST	690	21,2014	7 4710 1	MASK	BIT3
3236	REP	11	LAST	692	21,2015	27=501 0	ADS	RCSFLAGS
3237					21,2016	0 0008 1	EXTEND	
3238	REP	1			21,2017	3 2008 0	DCA	RCSADDR
3239	REP	11	LAST	690	21,2020	53=313 0	DXCH	TSLOC
3240	REP	12	LAST	685	21,2021	4 4105 0	CS	OCT80000
3241	REP	23	LAST	685	21,2022	7 0102 0	MASK	FLAGWRD8
3242	REP	40	LAST	676	21,2023	6 4875 1	AD	BIT14
3243	REP	24	LAST	692	21,2024	54 102 0	TS	FLAGWRD8
3244	REP	169	LAST	691	21,2025	0 0002 0	TC	Q

ACTIVATE RCS DAP

RCSADPN ENTRY MUST BE UNDER INT-INHIBIT
0.6 SEC ALLOWS TVCEXEC/ROLLDAP TO DIE
ENTRY FROM ROOTPOD
WILL CAUSE PRESADP (+1)

SET BIT3 TO REINITIALIZE FDAI ERROR
DISPLAY, IN CASE SC CNT SWITCH
IN SCS NOT GNC (QUIDEMODE PRIMARY)

(RCSATT)

SET BITS 15,14 TO 01 TO INDICATE
TS TAKEOVER BY RCSADP

KILLS TVCEXEC AND ROLLDAP STARTS

RETURN TO CALLER (TVCDAPOF OR RCSADPUP)